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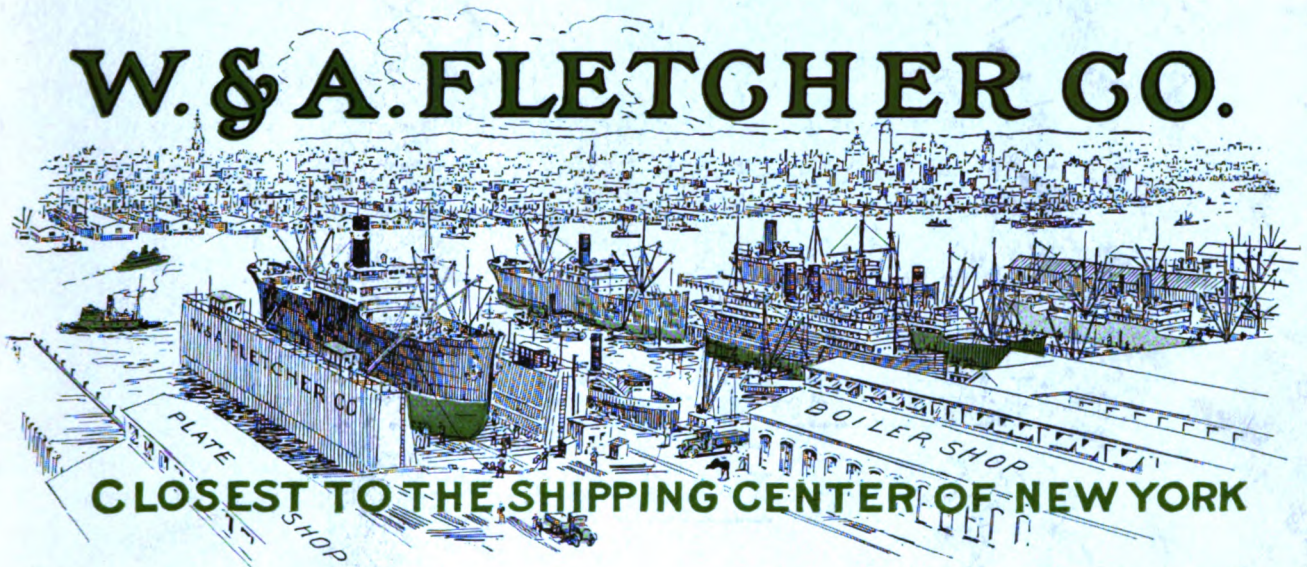

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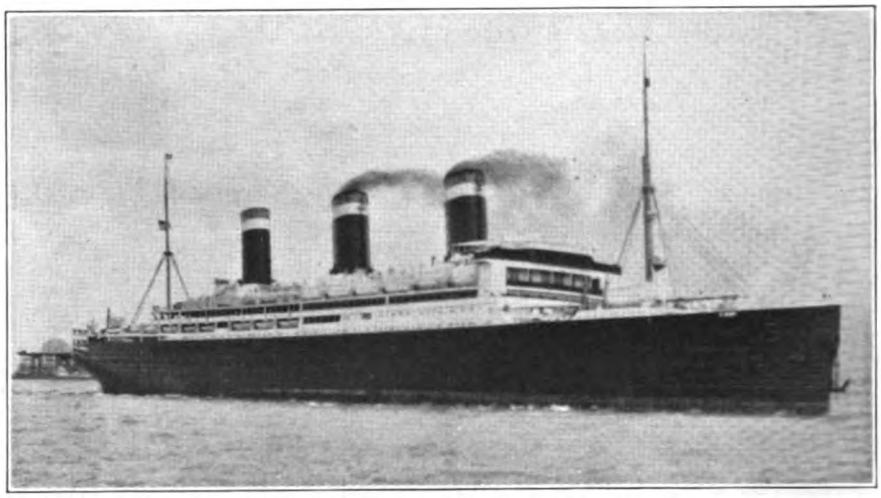
History of U. S. Liner Leviathan



IN THE history of the world, ancient and modern, ships have always played an important role. The LEVIATHAN now about to begin, it is hoped, a long and honorable service under the American flag, is intimately bound up with the most important events in recent history. She was designed and built as a challenge to the skill, resources and courage of the maritime powers of the world. When completed under the name of VATERLAND in 1914 at the yards of Blohm & Voss, Hamburg, she exceeded in size and appointments any other merchant ship and represented the peak of accomplishment in the fast growing and powerful merchant marine of Germany.

All peaceful competition for supremacy ended on the first day of August, 1914 and this fateful day found the pride of the German merchant marine at her berth in the harbor of New York, where, as she did not dare risk capture, she began the long vigil which ended in April 1917 when the United States entered the war. She was at once taken over by the navy and her German crew placed in custody.

Before this action by the government, members of the German crew had sufficiently damaged the vital machinery on board to prevent her immediate commission for sea duty. By skillful and energetic measures repairs to her machinery were carried out, passenger quarters below the D deck were removed and these spaces prepared for carrying a maximum of 13,000 troops as compared with her original passenger capacity of 3400. She was drydocked in Liverpool early in 1918.

As a transport operated by the United States navy, and renamed the LEVIATHAN she made 19 trips, beginning her first trip Dec. 15, 1917, and ending her last trip Sept. 8, 1919, moving over 190,000 American troops across the Atlantic, approximately one-twentieth of all American soldiers sent to and brought back from France. Then she was laid up at her pier in Hoboken. After a long delay in the determination of a government policy, plans and specifications were finally prepared for her reconditioning including conversion to burn oil, and the contract was awarded to the Newport News Shipbuilding & Dry Dock Co. on Feb. 15, 1922 for the sum of $6,110,000. The second general contract for equipment of the steward's department was awarded to Gimbel Brothers, New York, for $546,000. Other expenses, equipment and supervision, it is expected, will make the total cost about $8,200,000.

On April 10, 1922 the LEVIATHAN arrived at Newport News under her own power. After thirteen months and six days of intelligent supervision and the most dogged and persistent labor with over 2900 men of fifty different trades employed at times and an average of 2300 men during the entire period, the reconditioned LEVIATHAN sailed from Newport News on May 16, 1923 bound for Boston. Arriving in Boston on May 18, after an uneventful voyage, the big liner drydocked in the large navy graving dock in South Boston. An immense amount of work, was necessary in the Boston dock to place on board and in order a vast quantity of movable equipment, hangings, decorative materials, and last, but not least, in scrubbing, cleaning and placing the liner in absolutely ship-shape condition throughout.

On July 4 she will embark her passengers for her maiden trip across the Atlantic under the American flag as a merchant ship.

This ship has now been brought through three important periods of her history and is facing the fourth with the eyes of the entire American nation anxiously turned to her as a concrete expression of the inception of a determined effort to regain a fair and justifiable prestige and standing in the ocean-carrying trade of the world. America having set her hand to this task, should it fail through any cause, will not only have lost millions in money, but what is of much greater value, the moral setback of defeat and thwarted aspirations. As Americans the thought of ultimate failure can not be tolerated. Therefore, there is the assurance of faith in America that the years to come will see a rehabilitated merchant marine commensurate with the nation's greatness.

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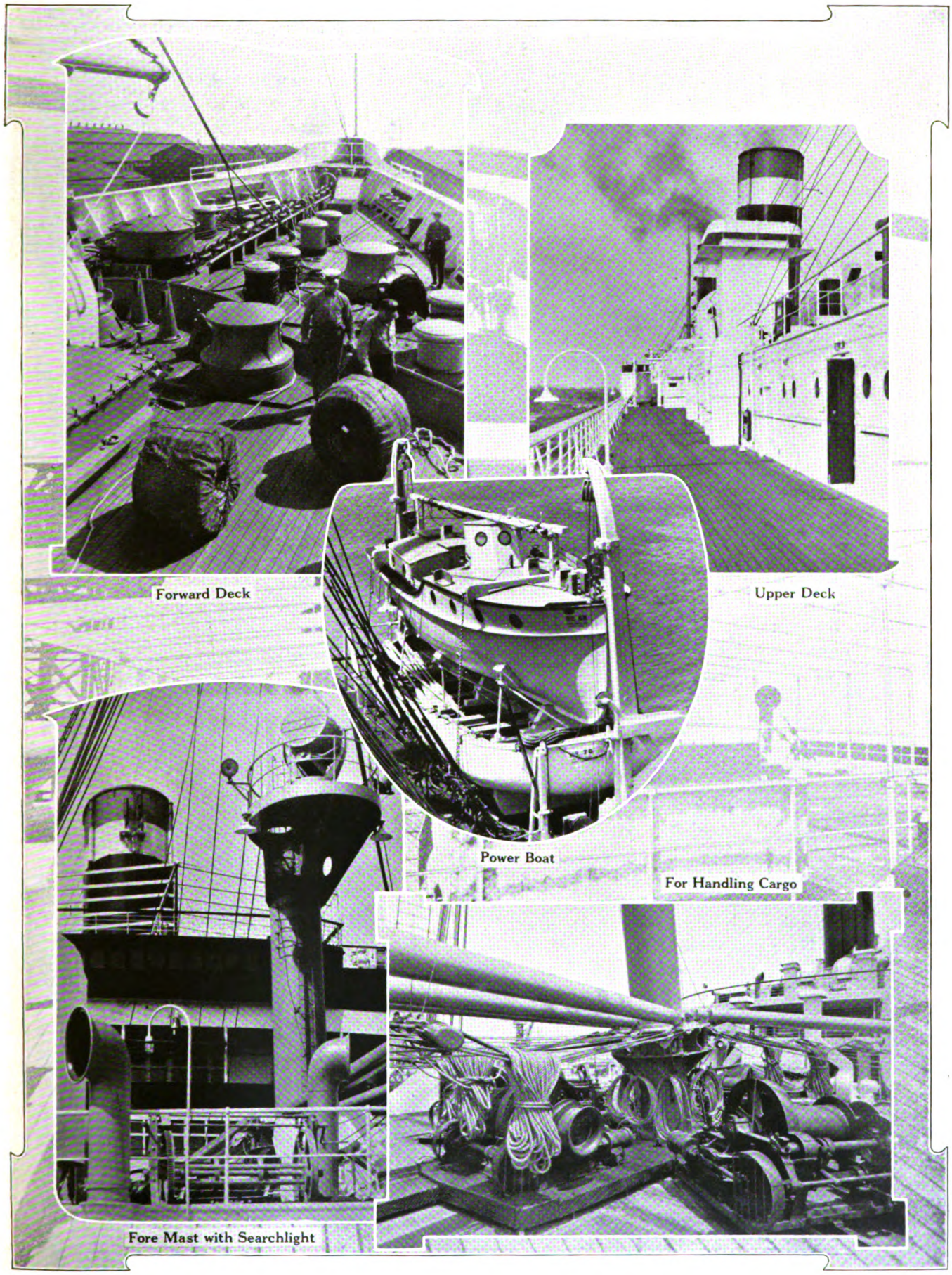
Deck Views on the World's Largest Liner



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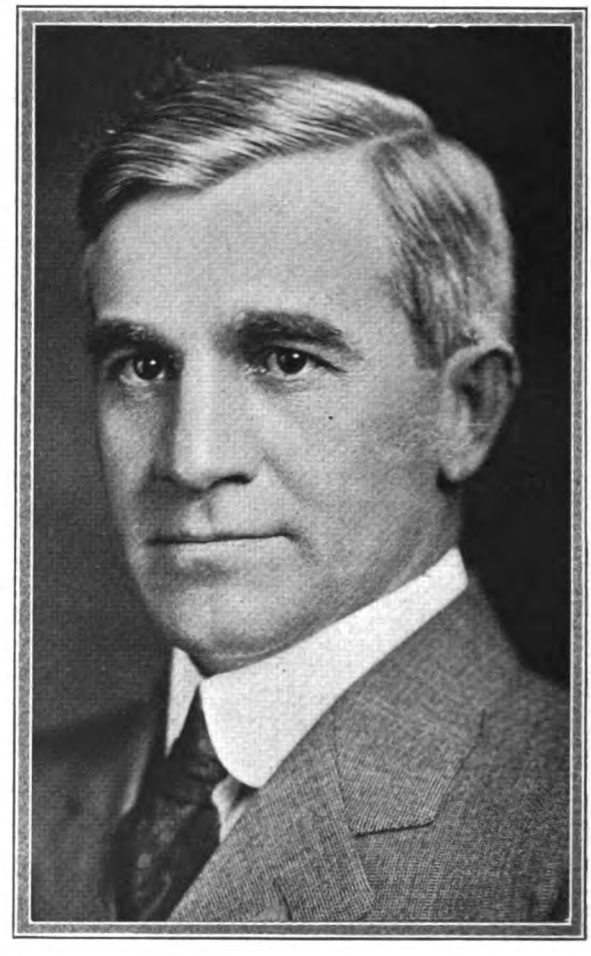
Leaders in a

WHEN the immense task of reconditioning the LEVIATHAN was first seriously considered not the slightest hesitation was felt, at least among Americans, as to the ability of American industry to accomplish the work in record time and in an approved fashion. The problem resolved itself into two major divisions, first planning the work under a single responsible capable leader, second carrying the work through to a satisfactory conclusion in the time allotted, under a leader of ability, vision and the power to do things. For the satisfactory completion of this, the largest ship reconditioning contract ever carried out



Homer L. Ferguson

HOMER L. FERGUSON was born in Waynesville, Haywood county, North Carolina, March 6, 1873, and graduated from the United States naval academy in 1892 and from the naval college, Greenwich, England, in 1895. He was commissioned an assistant naval constructor in the construction corps of the United States navy and served from 1895 to 1905 as an officer of the navy supervising and directing naval work at Baltimore, Portland, Oreg., navy yard at Bremerton, Wash., Bath Iron Works, Bath, Me., Newport News, Va., and the bureau of construction and repair at Washington. Since 1905, Mr. Ferguson after resigning his commission in the navy has been associated with the Newport News Shipbuilding & Drydock Co. in various capacities, becoming president and general manager in 1915.

No account of his rapid rise in his profession would be complete without mention of something distinct from his professional training and experience. He has in a remarkable degree the rare qualities of the born leader in that his personality draws out the most enthusiastic and friendly co-operation from the simplest workman to the chairman of the board of directors and owners. Without the power to instill this loyalty and enthusiastic confidence in his leadership, the big job of reconditioning the LEVIATHAN could not have been accomplished in so short a time, nor would the work have been of such consistently high quality throughout.

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Colossal Task

in any American shipyard or in the world for that matter, the country is indebted to William Francis Gibbs for the planning and to Homer L. Ferguson as head of the Newport News Shipbuilding & Drydock Co. for carrying out the work.

It is the intention here to record a measure of credit to these two men as the respective leaders and to give a few facts concerning their careers always keeping in mind that it was possible to accomplish what they did only through the ability, co-operation and hard work on the part of the thousands of men associated in the detail planning and actual performance.

William F. Gibbs

WILLIAM FRANCIS GIBBS, president of Gibbs Bros., Inc., engineers, is a graduate of Harvard university. He traveled and studied abroad, and prior to the outbreak of the war had made a particular study of the largest types of passenger liners. Mr. Gibbs first came into direct contact with the LEVIATHAN as chief of construction for the International Mercantile Marine Co., while she was under this company's care acting as agent for the United States shipping board. In this capacity he made a thorough and detailed study of the giant liner, so that when the shipping board finally settled on the policy of reconditioning, he was without doubt the best informed man in the country as regards this ship.

There are three outstanding facts about Mr. Gibbs, the first his breadth of experience and training as an engineer, the second his thoroughness and insistence on the best, and the third his courage and readiness to accept unlimited responsibility. If he has erred in any direction it has been in his passion for the sort of completeness in the reconditioning which would not allow anything to remain that could be improved.

The work which he was called on to carry out required the cool calculating head of an engineer and in addition the vision of a dreamer and the courage, decision and driving qualities of a man of action. Those who have had intimate contact with this work will recognize that he has these qualities in full measure.

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How the Big Task Was Completed

A BRIEF history of the LEVIATHAN has been recorded elsewhere in this issue in which her reconditioning is touched upon as one phase or one period in her career. It is this phase or period of her career, however, which has once more fixed the attention of the entire world on the United States in surprise and astonishment, if not in admiration. The highly skilled and trained shipbuilding experts of the old world were dubious as to the outcome of such a pretentious attempt in their special art, on account of the comparative inexperience of our engineers and shipbuilders in work of such magnitude. But no one can deny that the rebuilding of the LEVIATHAN into one of the world's finest liners, second to none, is now an accomplished fact. Here in a record to commemorate this task, it may be well to note the following dimensions and particulars of the LEVIATHAN taken from the final specifications prepared for this work by William Francis Gibbs and from information furnished by his office:

Capt. Herbert Hartley

Length over all, feet, inches	949-9
Length between perpendiculars, feet, inches	928-5
Beam molded, feet, inches	100-0
Depth molded to D deck, feet, inches	70-4¼
Normal mean load draft, feet, inches	40-0
Gross tonnage as per new admeasurement after reconditioning	59,956
Net tonnage as per new admeasurment after reconditioning	27,696
Deadweight carrying capacity on above draft, tons	16,240
Capacity of fuel oil compartments (exclusive of T. peak), tons	9,616
Maximum shaft horsepower, about	100,000
Normal shaft horsepower-service condition	65,000
Normal speed, service condition, knots	22

Parsons reaction turbines direct connected—4 screws
Solid bronze 4 bladed propellers
46 modified Yarrow type water tube boilers

Accommodations

First-class passengers (704 beds, 19 Pullman berths and 250 sofa berths), 973; second-class passengers, 548; third-class passengers, 944; fourth-class passengers, 934; total, 3399; officers and crew, 1100; grand total, 4499.

In addition, a portion of bunker spaces on H deck will be provided with necessary access and ventilation to permit space for accommodating 400 fourth class passengers in case of emergency.

* * *

Policy Leading to Reconditioning

ON SEPTEMBER 8, 1919 the U. S. S. LEVIATHAN, under command of E. H. Durrell, United States navy, arrived in the port of New York with General Pershing, his staff and troops of the First division on board. She docked at her berth in Hoboken, and her service as a transport at an end, she was turned over to the shipping board. Practically at once, some consideration was given to the possibilities and advisability of refitting and converting her into an oil burner and placing her in the transatlantic passenger trade under the American flag.

In casting about for ways and means of accomplishing this end, the shipping board entered into an agreement with the International Mercantile Marine Co. by which this company was to be responsible for the upkeep and care of the ship during her lay up and to carry out under the control of its organization, plans and specifications for her reconditioning. It was in pursuance of this agreement that W. F. Gibbs, chief of construction for the company, in December, 1919, seriously commenced work on definite plans and specifications for reconditioning. These first plans and specifications were completed in April, 1920, and bids were requested. Only two bids were received and both were rejected as the prices asked were excessive.

In the late summer of 1920, W. F. Gibbs began work on the plans and specifications which, when completed in November and December, 1921, after 14 months of the most difficult and intense sort of labor, were used to obtain bids and to carry out the work. About this time the question as to the allocation of the completed ship came up for serious consideration. The shipping board, after an investigation, decided against the International Mercantile Marine Co., for operation of the LEVIATHAN, when completed. In view of this step, the company did not feel it was justified or in a true position in going on with its organization in reconditioning the ship. Desiring to continue with the plans laid down, the government through the shipping board called upon W. F. Gibbs as an individual and as a citizen, to take active charge of the LEVIATHAN and authorized him to carry through the plans made for her reconditioning. In January, 1922, therefore, W. F. Gibbs severed his connections with the International Mercantile Marine Co., organized the firm of Gibbs Bros., Inc., called for and received bids for the reconditioning and awarded the contract to the lowest bidder, the Newport News Shipbuilding & Dry Dock Co.

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Comfort and Good Taste in Public Rooms

Social Hall, First Class

Entrance to Social Hall

Tea Room, First Class

Library, First Class

Smoking Room, First Class

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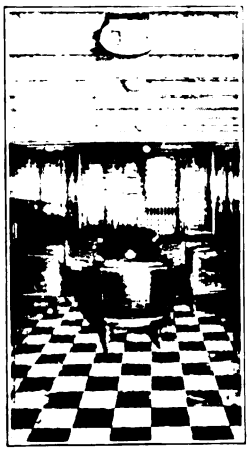
Now for a glimpse of the scope of the plans and specifications which required 14 months of unremitting labor on the part of Mr. Gibbs and a large staff. The main volume of general specifications contains 1024 closely printed pages. There is a separate volume of machinery specifications of 122 pages and a volume of steward's specifications of 146 pages. Two volumes of photostat plates detail in the most specific and minute detail, the furniture, accessories, electric lighting fixtures and other equipment necessary to make a complete and artistic job. All drawings, including the lines, general arrangements and details, had to be prepared from data taken from the ship. So carefully was this work carried out that the plan for drydocking the ship based on the line drawing was found to be entirely accurate when she was drydocked in Boston.

The original builders of the LEVIATHAN and the German government, of course, had the complete plans of the vessel from which she was built, but it was found in negotiating for a set of these plans that a prohibitive price was asked.

Reconditioning in the Shipyard

THE immensity of the task which faced the organization of the Newport News Shipbuilding & Dry Dock Co. when the LEVIATHAN arrived at the yard in April 1922 fairly staggers the imagination. The time limit of 14 months would seem to the seasoned shipbuilder an impossible condition. Even in a free labor market with any number of all kinds of skilled labor available on demand (a condition which did not exist) there was the physical impossibility of working over a certain maximum number of men at the same time. The peak of the labor load was reached in August and September, 1922, when over 2900 men comprising 50 different trades were employed.



Lobby, Second Class

Statistics of all sorts could be given but statistics are likely to be dull and lacking in the flavor of human interest. More than any other factor it was the personal feeling and interest on the part of those who worked on the LEVIATHAN that made this record accomplishment possible. It was this sort of feeling that made men of certain trades in which the required number of skilled men were not available co-operate willingly with men of different trades in doing a part of their work. It was this interest which prompted office men, some in responsible positions, to don overalls after hours and spend their evenings working on board, installing hooks, drawer handles, hinges and fittings. It is the intention below briefly to outline under the major divisions of the entire work, the main features in extent and methods.

* * *

Conversion to Fuel Oil

THE LEVIATHAN was built as a coal burner and continued as a coal burner during her service as a transport. With a battery of 46 boilers probably requiring in the neighborhood of 1000 tons of coal a day, the work of firing involved a prodigious amount of labor. In order to promote thermal efficiency, ease of keeping up steam, the elimination of hard labor and a vast improvement in general fireroom conditions and in keeping with modern marine practice, it was entirely fitting and proper to convert this ship to burn oil instead of coal.

This item so easily encompassed in a single phrase "convert to burn oil" required in all its ramifications an enormous expenditure and a vast amount of labor. Fortunately no deterioration was found in the structure of the ship itself. The large bunker spaces in the ship had to have structurally substantial oiltight bulkheads and swash bulkheads fitted to the requirements of the American bureau for oil compartments. Double bottom compartments had to be tested and altered to meet oiltight requirements. An idea of the extent of this structural work may be realized when it is noted that the total capacity of all fuel oil spaces, exclusive of the forepeak, is 9616 tons, a quantity greater than the entire cargo capacity of a 400-foot oil tanker.

Under ideal conditions reckoning on six days from New York to Southampton, this quantity of fuel oil may be sufficient to take the ship across and back without taking on any oil abroad. A more conservative estimate, however, would indicate a possible consumption of 10,400 tons for the round trip, requiring, unless fuel oil is also carried in the forepeak, the purchase abroad of 1500 to 2000 tons, allowing for the necessary reserve. The bunker fuel oil capacity of the LEVIATHAN is said to be greater than that of any other ship in the world.

Another extensive and all important part of conversion to an oil burner was the choice of and installation of an efficient oil burning equipment. The oil burning equipment chosen was furnished by the Peabody Engineering Co. and the design is the result of specialization on the part of the designer in the field of oil burning. The layout and installation of a complete fuel oil piping system, transfer pumps, service pumps, heaters, strainers, filling and temperature indicators, was still another big part of the work and was done by the shipyard with equipment furnished by a number of different firms.

* * *

Machinery Thoroughly Overhauled

OVERHAUL and reconditioning of the machinery though a large job and one requiring great skill and care, of all the major divisions of the work was

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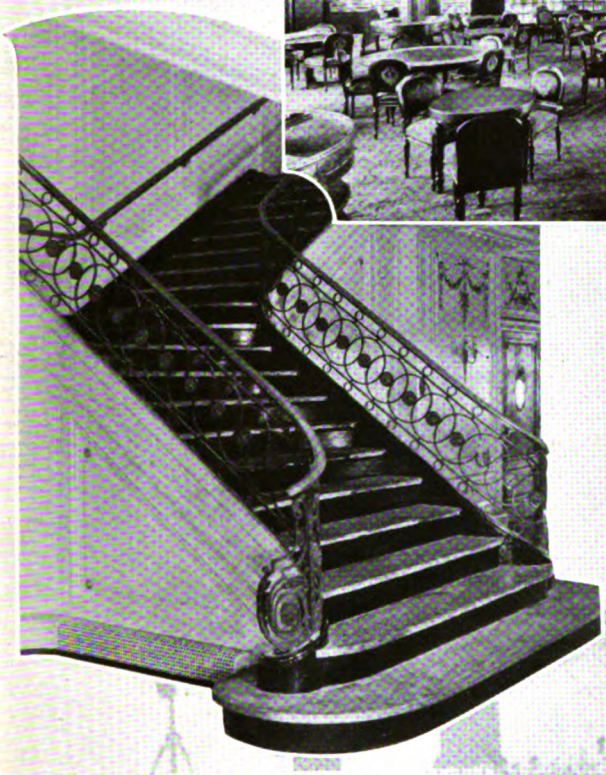
Dining Accommodations Set High Standard

Ritz-Carlton Restaurant



Stairway to Dining Room

Corner in Dining Room

Dining Room, First Class

Corner in Ritz Restaurant

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without doubt the most specific and definite in its nature. In this work, both as regards its engineering staffs and shops the shipyard was on solid ground, it was entirely at home. This work can be divided into two general parts, first the overhaul and repair of all existing machinery to be continued in use and, second, the complete installation into the machinery system of replacements and additional equipment.

Four Parsons reaction type turbines each direct-connected to separate shafts constitute the main drive of the ship. Each turbine casing was lifted and a thorough detailed inspection was made; all repairs necessary to blading and bearings was carried out with the utmost care. Clearances and alignments were carefully checked up and corrected as needed. Condensors were retubed and all pumps and auxiliaries were placed in good working order. The lagging on all steam and exhaust piping and surfaces was given particular attention and an especially good job was done in this respect, far superior to the original work and the results will show greater economy in steam.

Valves and piping were overhauled or renewed. The 46 boilers were thoroughly cleaned, scaled and coated, tubes were swept clean and tubes showing signs of deterioration were renewed. The entire refrigerating machinery and auxiliary outfits of carbon dioxide type were thoroughly overhauled. Engine signal systems, controls for operation, lubricating system and the hydraulic watertight doors control were all reconditioned and improved. The elaborate steering and windlass machinery and gear received careful attention and was placed in good order.

The original electrical machinery was reconditioned and one 500 kilowatt General Electric turbine reduction geared generator was installed. A new auxiliary lighting set of two units, 60 kilowatts each, Worthington diesel engines direct-connected to General Electric generators was installed complete in a special compartment on the after end of E deck This description is only a bare outline of the variety and the detail of the machinery reconditioning. In a ship nearly 1000 feet long, 100 feet wide with nine complete decks, with a maximum of 100,000 horsepower in the main machinery, with 46 boilers supplying the steam, with auxiliary machinery from a 1/6-horsepower motor running an apple paring machine to a 500 kilowatt generator, with machinery of all kinds for all manner of service such as raising and lowering the lifeboats, blowers for the ventilating system, passenger and freight elevators, dumb waiters, hoists and cargo winches, thousands of varied and intricate tasks were quickly and efficiently performed by the machinery department.

Promenade Deck

* * *

Heating System Is Copper

ANY one familiar with ship work knows what a maze and network of piping is necessary in the simplest cargo ship. One can easily imagine the multiplication in quantity and the far greater complexity of the piping of a ship like the LEVIATHAN carrying a possible maximum, including the crew, of nearly 5000 persons. All of this piping did not, of course, have to be renewed, but the extent of new piping and renewal of old lines was immense in the aggregate. For instance, in converting from coal to oil, a complete system of oil filling and suction pipes had to be installed. Lines of pipe which would make it possible to transfer oil from the deep bunker tanks, and lines from the double bottom tanks to the settling tanks were installed as well as lines from the settling tanks to the burners by way of the oil heaters. Steam and exhaust piping, bilge and ballast lines, fresh water and salt water lines form a veritable net work throughout the ship. All of these lines had to be carefully gone over foot by foot and tested and renewed where necessary.

The plumbing was in itself an exceedingly large contract and meant months of difficult and complicated work. In the steam heating, copper piping was specified throughout with radiators of coil or door sill type. It is said that over 200,000 pounds of copper pipe was used and this can be readily visualized when it is considered that approximately 2000 separate radiators were installed. Brazed metal flanges were used throughout and solid drawn copper tubing ⅜-inch and ½-inch in diameter was used for both steam and exhaust. Though the steam heating system is to operate at a maximum pressure of 30 pounds per square inch, it was all tested to 75 pounds. Furthermore, all the steam piping for heating purposes between the auxiliary steam line and the outlet of the last reducing valve was tested to 460 pounds per square inch. No ship, it is safe to say, has ever had a steam heating system installed under such drastic specifications and of such quality of material.

* * *

New System of Ventilation

THE ventilation system was thoroughly revamped. However, all of the original electric motors and blowers were found to be in such condition that they were made use of after having been placed in perfect working condition. Additional motors, direct connected to fans were necessary and for this equipment Sturtevant blowers and Diehl motors were used. Most interesting and important in the new ventilating system is the materially increased safety of the ship which has resulted from changing the old sys-

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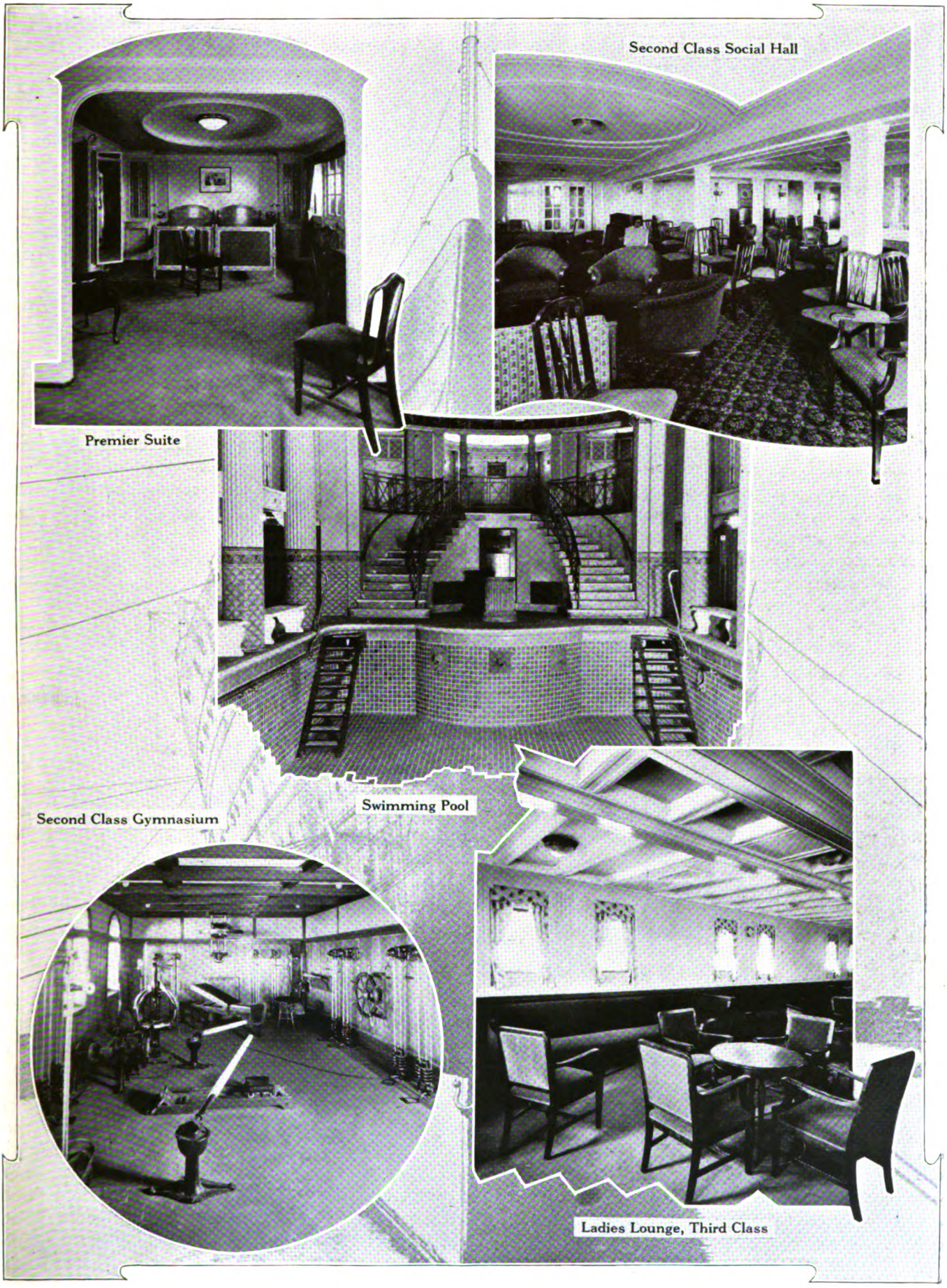
A Group of Public and Private Rooms



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tem of the ship which required passing ducts through watertight bulkheads at points dangerously low. These duct apertures were riveted over with solid heavy plates, and ventilators of a special design were installed on the upper deck in such position that the various compartments were properly ventilated without carrying air ducts through watertight bulkheads. In this way, should a certain compartment of the ship be punctured, the bulkheads will act as they were meant to act to prevent water from passing into adjacent compartments.

* * *

Galleys and Culinary Arrangements

A SPACE occupying the entire width of the ship beginning directly aft of the main dining saloon on the F deck, continues from this point a distance of more than 100 feet. Any one entering this part of the ship can not fail to be impressed with the sense of cleanliness, airiness, order and the utmost completeness in the minutest details of the equipment. All the paraphernalia of the most up-to-date kitchen of the finest hotel has been installed. The floors are tiled and stoves, soup kettles, vegetable steamers, baking ovens, potato peelers, egg boilers, dish washing machines, cup racks, dish racks, electric toasters, coffee urns and all other cooking equipment and utensils are arranged with the greatest thought to the comfort and convenience of the chef and his staff.

* * *

Difficult Joiner Work

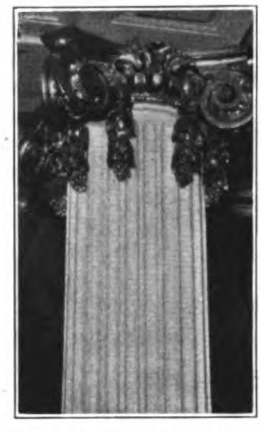
IT IS impossible to appreciate the amount and infinitely varied character of the joiner work to complete the LEVIATHAN, using as a basis any other work ever done. This work constituted the largest major division. When the LEVIATHAN was turned into a troop ship, all decks below the weather or D deck were completely gutted and cleared to make space for accommodating a maximum number of soldiers. Decks E, F, G, H and portions of J, therefore, had to be laid out according to new plans subdividing them into rooms and other spaces for a variety of uses. Some conception of the work involved may be gained by noting that approximately 150,000 square feet of heavy ply board and 100,000 square feet of composition board were used. It was found advisable to install electrically driven wood working machinery on board during the course of the work. The new work was remarkably well done and compares favorably with the finest ship joiner work.

Carved Fisherman

On D deck and above an immense amount of reconditioning of existing work was necessary. Entire new floor coverings had to be fitted of rubber tile, cork tile and cork composition. The first class dining room, 10,000 square feet in all, was covered with a composition from 1½-inch to 2 inches thick, with a heavy fitted and sewed carpet over all.

Vandalism and carelessness had done seemingly irreparable damage to beautiful and valuable original work. As an instance, wonderfully tooled heavy leather wall coverings in the first-class smoking room had been cut with a knife and so badly damaged that repairs were impossible. As this covering could not be duplicated, the shipyard concealed these spaces by building in two bookcases which are in exceptionally good taste and of excellent workmanship.

The joiner shop was called upon for the highest skill of the wood working craftsman. Ornately carved capitals for corinthian columns were renewed and repaired. Elaborate alcove bulkheads in the dining room were rebuilt and repaired matching the original carvings and decorations. Four carved figures representing old men of the sea were repaired to conform with the original. There is a story for which the authenticity is doubtful, that the expressions on the faces of these figures were skillfully changed to represent American types. A great many folding wash basin cabinets were reconditioned and many new ones, patterned after the original, were built. A good deal of the original furniture for certain public rooms and staterooms was repaired, in many cases a new leg or an arm was made and the wood and finish so perfectly matched that one could not tell these pieces from the original. The matching to perfection of rare original woods in the joiner work of the ship was done with remarkable skill. The joiner department of the shipyard deserves great credit for the skill and ingenuity shown in craftsmanship on board this ship.



Skillful Joiner Repair

* * *

Ship Carpenter Work

CAREFUL detailed inspection was made of all the wooden decks of the ship. All seams showing the slightest signs of cracks or chipped glue were cleaned out, caulked with oakum and repayed with marine glue. Any defective planks were renewed and locally bad spots made good by inserting graven pieces. As a result every foot of every wooden deck is as good as new. A teak platform was fitted around the compensating compass, sections of teak rail and hand rails for ladders were renewed where damaged or missing.

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Galley Equipment Ideal for Ship's Use

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The standing rigging had new seizing fitted where necessary and every inch of it was coated with the best preservative. New running rigging, cargo falls, vangs stays and blocks were fitted. All cargo booms, goose necks and eyes were overhauled and placed in easy working condition. Roller chocks, cleats, bollards, ring bolts and fastenings received careful attention.

Old and new navigating instruments were overhauled or fitted in place. The steering gear, anchors and chains were thoroughly overhauled and placed in good order.

* * *

Electrical Equipment Is Complete

AN ENORMOUS amount of electricity will be used for lighting throughout the ship and for power to run over 300 motors from 1/6-horsepower to 50-horsepower in size. To generate this great quantity of electricity, four of the original 288 kilowatt turbo-generating sets have been reconditioned. In addition, one 500 kilowatt General Electric turbine reduction geared generator has been installed. All of this generating machinery is located in the main dynamo room on the center line of the ship aft of the engine room. Miles of the best insulated wire cable has been used to carry the current throughout the ship. The main switchboard is located in the dynamo room and there are numerous substation switchboards all over the ship. The main switchboard is of the most modern type as built by the General Electric Co. and is so arranged that the generators supplying the current can have their loads pooled. The old wiring in the main was entirely removed and the American two-wire system is now in use. All of the wiring, outlet boxes, switches and other equipment and the manner of installation meets the severest underwriter's tests.

Winter Garden Entrance

Aside from and independent of the above generating equipment, two 60 kilowatt Worthington diesels direct-connected to General Electric generators are installed in a special room aft on the E deck well above the danger point in case of accident to the ship. These sets will give necessary light and power in case of an emergency. There is also a large battery recharging installation.

The detailed technical features of the electrical installation on the LEVIATHAN would be a study in itself and is worthy of the study and attention of electrical experts. All that modern knowledge and development in the science of electrical engineering has brought out, has been used to make the electrical system of this ship eminently safe, adequate and convenient and this work is a credit to the contractors who supplied the equipment and to the yard for the installation.

* * *

Improvements and Aids to Navigation

SURELY no other ship is better supplied with safeguards and aids to navigation. The original telegraph system to the engine room has been placed in first class working order. Additional telegraphs have also been installed. In addition to the original compasses, a compass of standard navy type has been installed. Two master Sperry gyro compasses have been fitted in a room in the vicinity of the machinery space. Six repeaters are controlled from the master gyro compasses and will conveniently indicate the true position of the ship. A Sperry course recorder accurately plotting the course of the ship is provided. A very powerful Sperry searchlight of 450 million candlepower, controlled from the bridge for motion in both vertical and horizontal planes is fitted on a platform well up on the foremast.

The original loud speaking telephone system to stations on the ship with buzz signals, has been completely reconditioned. The control for operating all the watertight doors of the ship is located in the wheel house. There is also telephone communication with stations on board. Submarine signal apparatus has been installed. A draft gage indicating the draft of the ship fore and aft, the mean draft with corresponding displacement of the ship has been installed as well as numerous gages and warning signals for determining depth of oil in tanks.

* * *

Fire Protection

THE greatest conceivable care has been taken to guard against the danger of fire on board. Three alarm systems have been installed; one called the manual fire alarm by means of which alarms can be sent in from boxes located throughout the ship to a central station resembling that of a fire station on shore. The system in the central station indicates the vicinity of the fire and the necessary measures to fight the fire can be set into action at once by means of hose lines under pressure and hand chemical extinguishers. This system has been designed by Charles Cory & Son, Inc.

A second system is known as the Aero fire alarm designed and installed by the Aero Fire Alarm Co. This is a very interesting system and works on the principle of the expansion of hot air. Fine copper tubing, approximately a sixteenth of an inch outside diameter is run from the central station to all parts of the ship excepting cargo holds, machinery spaces, etc. The tubing ends in a coiled rosette in any space from which the alarm is to come. On a fire breaking out in any such space, the air in the tubing becomes heated, expands and by means of a mechanism

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in the central station closes an electric contact which gives the alarm by means of a gong. The indicators in the central station are so arranged that the immediate vicinity of the fire may be noted.

The third alarm system is the Rich system for smoke detecting and fire extinguishing. The smoke detecting cabinet is also located in the central station on the bridge deck not far from the wheel house. The principle on which this system acts is that of individual pipes leading to the compartment in question ending in this compartment with a bell mouth receiver in the ceiling of the compartment. By means of small blowers driven by an electric motor a suction is created in the line so that smoke will at once pass through the pipe and come out of an aperture on the end of the pipe in the cabinet. These apertures are marked corresponding to the compartments to which they are connected. This system of fire detection is used for cargo spaces and in case of fire the steam smothering system is made use of for extinguishing it.

As an extra precaution against dangerous fires in the boiler room of the ship due to the use of fuel oil, an elaborate system called the firefoam has been installed by Charles Cory & Son, Inc. The firefoam machinery room and tanks are located on the H deck. There are two different solution tanks each of the capacity of 3500 gallons. These solutions are pumped in case of need to any part of the boiler rooms or to filling stations. The Northern Fire Apparatus Co. rotary pumps are used, driven by 50-horsepower Alberger Curtis steam turbine and another unit by a 50-horsepower Diehl motor. On the solutions being mixed over places where oil can collect, the foam formed will be spread over the fire. In the boiler rooms are also installed firefoam hose hydrants which can be used for putting out small fires.

* * *

Furnishings Are Tasteful

FURNISHINGS and decorations now on the LEVIATHAN are superior in taste and quality to her original condition when she came to New York as the very last word of the German merchant marine. Walker & Gillett, architects, have been responsible for the interior decoration and furnishings and have done their work well. In matters of this sort, as far as furniture, draperies, hangings, and carpets, are concerned, American industries are able to hold their own and all of this equipment was ordered from American firms.

* * *

Painting Is High Quality

IT WILL be readily recognized that painting is an exceedingly important part of the refinishing of the ship. This work has been done, inside and out, in cargo spaces, engine room, boiler rooms and in the beautiful public rooms and passenger suites de luxe by the paint department of the shipyard. The supervisors of the artistic finish of the ship were frankly skeptical in regard to the ability of the shipyard's painters to do the extraordinary grade of work desired until they were convinced by examples of the most difficult work. After this they were thoroughly convinced, and unbiased opinion acknowledges the completed work as of exceptional quality. Great care has been taken in removing all scale and rust and in thoroughly coating to permanently preserve all parts subject to deterioration. In this connection the work done in preserving the structure of the ship during her long lay up under the care of the International Mercantile Marine Co. can not be praised too highly. The measures then taken have added years to her life.

Course Recorder

* * *

In Drydock at Boston

IN MAY 18, 1923, the LEVIATHAN entered drydock at South Boston, the only dock in the United States large enough to accommodate her. In drydock it was found that the bottom was in remarkably clean condition, the hull was free from marine growth, pitting and corrosion. While the steel of the hull had perfectly resisted oxidation, the skeg of steel plates riveted to the stern for carrying a part of the rigging for the otter gear, a mine-sweeping device invented, supplied and installed by the British government, had been practically completely disintegrated, through continuous submersion in sea water since the last drydocking five years before.

While in drydock, the hull of the LEVIATHAN was thoroughly scraped and brushed to a clean surface. Bilge keels were fitted and secured to the hull on both sides at the turn of the bilge. As this ship is now an oil burner and carries fuel oil in certain deep tanks and double-bottom compartments, flush manhole plates were fitted in the bottom of the ship for access to these tanks for purposes of quick cleaning and ventilation in future drydocking when work for any reason is called for in the way of the fuel oil tanks.

The four solid 4-bladed bronze propellers were found to be in good condition. It is possible, however, that one of the two spare propellers furnished by the William Cramp & Sons Ship & Engine Building Co., will be substituted in place of one of the old propellers. All of the propellers were removed and the four tail shafts drawn for inspection of the liners and the rewooding of the stern bushings. The rudder was unshipped and the gudgeon bushes and pintles examined and repaired as necessary. Up to the water line, the hull was carefully covered with anticorrosive and antifouling paint.

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On a Trip Through the Great Liner

TO GIVE some adequate idea of the size of LEVIATHAN as far as steel hull proper is concerned, consider her overall length, nearly 950 feet, her breadth of beam, 100 feet, and her depth to the main weather deck, over 70 feet. On top of this main structural part of the ship are terraced three decks extending over approximately 600 feet of her length. The upper structural or weather deck is called the D deck. Above this, therefore, C, B and A decks are found. Above the A deck is a comparatively short deck called the bridge deck.

Imagine a tour of inspection, beginning on the forward end of the bridge. This bridge extends in the flattened arc of a circle from side to side of the ship, running somewhat beyond, in order to give a good view for the officer on the bridge. The remainder of the bridge deck is given over to the wheel house, chart room, deck officers' quarters and to the captain's office, cabin and library. There is also an officers' smoking room and the central station fire alarm room.

Under the bridge deck at the forward end of A deck is located the first-class smoking room, a room beautifully finished in carved oak in early English. Aft of the smoking room on the A deck is a foyer and stairway leading to B deck. The first-class social hall is found aft of this foyer and occupies both A and B deck heights, giving a sense of spaciousness comparable to the lobbies of the finest hotels. The social hall is finished in French oak panelling and is decorated with four large beautiful paintings. The tables and chairs are of beautiful design and of the highest quality of construction. Carpetings, hangings and fittings have been chosen with care and good taste.

Aft of the social hall, on the A deck is located the first-class gymnasium, fully equipped with all the customary gymnasium apparatus. Aft of the social hall on the B deck is a spacious foyer at the forward end of which a stairway leads down to C deck. This foyer serves as a delightful communicating space or lobby between the social hall and the winter garden and Ritz restaurant on the B deck aft of the foyer. Both the winter garden and the Ritz restaurant extend through two deck heights, that is, B and A. The winter garden is a spacious and beautiful room finished in light color and a very striking effect in decorative interior finish has been obtained by the use of lattice work designs. In the Ritz, the original decorations have been kept. This room is panelled in mahogany and carved mahogany columns support the circular dome over the center. The mural painting in the dome has been redone and is fully equal if not superior, to the original.

Still further aft on A deck will be found the restaurant galley. On B deck aft of the Ritz restaurant is located one of the most delightful public rooms on the ship, the first-class tea room. The walls of this room are panelled and the wood is finished in a Flemish gray. The decorations and general character of the room is in the English period of Queen Anne.

At the forward end of B deck are several stateroom suites with baths. These suites are among the best on the ship and like all other passenger quarters, are simply and artistically finished and furnished. Different color schemes have been used such as light gray, light tan and corn color. The completed effect is one of harmony, restfulness and good taste. Directly aft on B deck is the library. This is a delightful and comfortable room and in keeping with its purpose. The walls are finished in large panels with decorative molding and have a light finish.

Beginning at the forward end of C deck and continuing to a point in way of the first-class tea room are first-class passenger staterooms and baths. Aft of the first-class staterooms on this deck are second-class staterooms and public toilets and baths. The second-class staterooms provide excellent accommodations, are well finished and comfortably furnished. Still further aft on C deck is the entrance to stairways to B and D decks and directly aft of the entrance to the stairways, an open veranda. The remainder of C deck is open except for a motor house for passenger elevators. Aft of the motor house is a hatch with trunk giving access to cold storage rooms.

D deck or the weather deck, being the top main strength deck of the ship, begins, of course, at the stem and continues to the extreme stern of the ship. Coming aft on this deck, the first place of interest is No. 1 hatch giving access to cargo holds on K and L decks. Directly aft of this hatch the fourth-class galley is located in a steel house, with a bakery and entrance to fourth-class quarters aft of the galley. Then comes No. 2 hatch, giving access to fourth-class baggage or cargo. The foremast, with cargo booms and winches, is located a short distance forward of No. 2 hatch. Just aft of No. 2 hatch are two cargo derricks with booms and winches. In this vicinity there is an additional entrance to fourth-class quarters. No. 3 hatch is located directly forward of the break in the house or the beginning of C deck. This hatch is served by the cargo derricks mentioned above and leads to the first-class baggage room.

Beginning aft of No. 3 hatch are first-class staterooms with passage ways running fore and aft both port and starboard to a point in way of the first stack. From this point on, there is a wide central passage as the uptakes from the boilers are brought up on the sides leaving the center free. The first-class passenger rooms continue aft on D deck to a point

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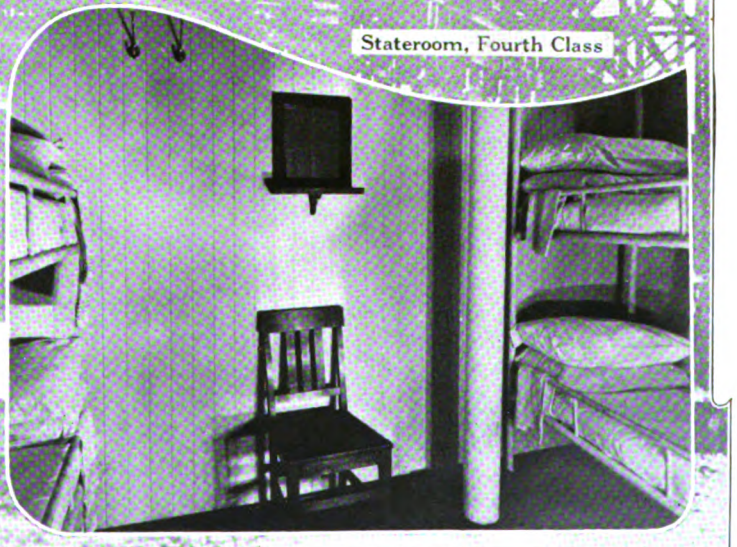
Comfort Reaches into Fourth Class Rooms

Stateroom, Second Class

Petty Officers' Quarters

Dining Salon, Fourth Class

Stateroom, Third Class



Stateroom, Fourth Class

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in way of the after stack. From this point on are found second-class public rooms. First, the smoking room which is comfortably and tastefully decorated and finished. Aft of the smoking room comes the second-class lounge, which, though somewhat simpler than the first class, is artistically and beautifully finished and is quite equal to first class accommodations on lesser ships.

The second-class social hall is located still further aft on D deck and this room in finish and appointments is very well done. The ceilings and walls are panelled in decorative moldings. The finish is a light color. Furniture and carpets are of excellent quality and design. The after mast comes up through in way of the lounge and is fitted with cargo booms and winches. Directly aft of the second-class lounge, D deck is open and hatches Nos. 5 and 6 leading to mail room and second-class baggage come up through D deck in this vicinity. The hatches are trunked to the spaces they serve in J and K decks. Aft of No. 6 hatch is located the third-class smoking room and third-class social hall. These rooms are comfortable and well furnished for their purpose.

The windlass machinery is located on E deck in the extreme bow. Beginning at the break of the house, E deck is occupied by first-class staterooms, baths and toilets. Aft of the staterooms is found the chief steward's office and stateroom, also the telephone central. Beginning in line with the central stack the first-class dining room is located on the F deck with the central part continued through two deck heights, that is F and E. This room occupies the entire width of the ship and a distance of about 100 feet fore and aft. The central part has a beautiful mural painting, oval in shape, in the ceiling. Grecian columns support arches around the room. The entire effect of the room is one of beauty, dignity and good taste.

Aft of the dining room on F deck will be found the first-class and second-class galleys. These spaces occupy the entire width of the ship. They are large, airy, and most completely equipped with all of the latest kitchen equipment. The arrangement of all equipment in the galley has been studied with the greatest care to minimize labor and to eliminate all confusion in the preparation and the serving of meals.

On E deck aft of the first-class dining saloon, are found more staterooms of intermediate type. That is, they can be used for either first or second class.

Aft of No. 4 hatch on E deck is found the third-class dining saloon and serving pantry. Still further aft on this deck is found the emergency dynamo room and steering machinery room.

The extreme forward end of F deck is used for stores. Aft of No. 1 hatch on this deck is located the fourth-class dining saloon. Aft of No. 3 hatch on this deck are located additional first-class staterooms, baths and toilets, valets' rooms and barber shop. About in way of the space between the first and second stack is located the Roman bath, extending from H deck up through F deck. The arrangements of this bath are on the style of the old Roman baths. The tiling is beautifully done in colors. The entire effect of the swimming pool is that of luxury, and practical usefulness. Aft of the swimming pool on F deck is found the beautiful foyer communicating to the first-class dining saloon. Aft of No. 4 hatch on F deck is located the second-class dining saloon. This room is quite the equal of many first-class dining saloons in other ships. It is very simply but tastefully decorated and furnished and it is spacious, light and cheerful. On F deck, aft of the second-class dining saloon will be found the chief steward's room, third class, the barber shop third class, public baths and capstan engine room.

The forward end of G deck is used for stores, chain locker, (this chain locker extends down to K deck) crew's quarters, fourth-class staterooms, additional crew's quarters, ventilating machinery, crew's galley, and the crew's wash rooms. At this point, the swimming pool intervenes. On G deck aft of the swimming pool, are found other auxiliary machinery rooms, crew's toilets and wash rooms, etc. The aft end of G deck is occupied by public baths and toilets of the second class and quarters for waiters.

On H deck forward, the extreme end is used for stores, and aft of this space are found fourth class staterooms. Aft of the fourth-class staterooms are crew's quarters, rest rooms, ventilating machinery rooms, spare bunker spaces. The aft end of this deck is taken up with second-class and third-class staterooms, and quarters for kitchen help.

Additional fourth-class quarters with open berths will be found in the fore end of J deck. Aft of these quarters on this deck is located the first-class baggage room, until the forward boiler room bulkhead is reached. From this point to a point approximately midway between the two after stacks the space is occupied by boilers to the number of 46, located in four separate firerooms. Aft of the boiler rooms will be found the main engine rooms of the ship. Aft of the machinery space on J deck will be found ventilating machinery, dry stores, mail room and baggage room, for third class.

The forward end of K deck is used for cargo and fourth-class baggage or cargo. Aft of the machinery space on K deck will be found additional ventilating machinery, cold stores, second-class baggage and fresh drinking water tanks. L deck forward is used for cargo and the extreme forward end for salt water ballast. Aft of the cargo space will be found the deep fuel oil tanks extending all the way to forward boiler room bulkhead. The space in the lower part of the ship aft of the machinery is occupied by the dynamo room and fresh water tanks. Fuel oil is carried in the double bottoms from the fore peak bulkhead to a point in way of central stack. From this point aft the double bottoms to the end of the shaft alley are used for fresh water.

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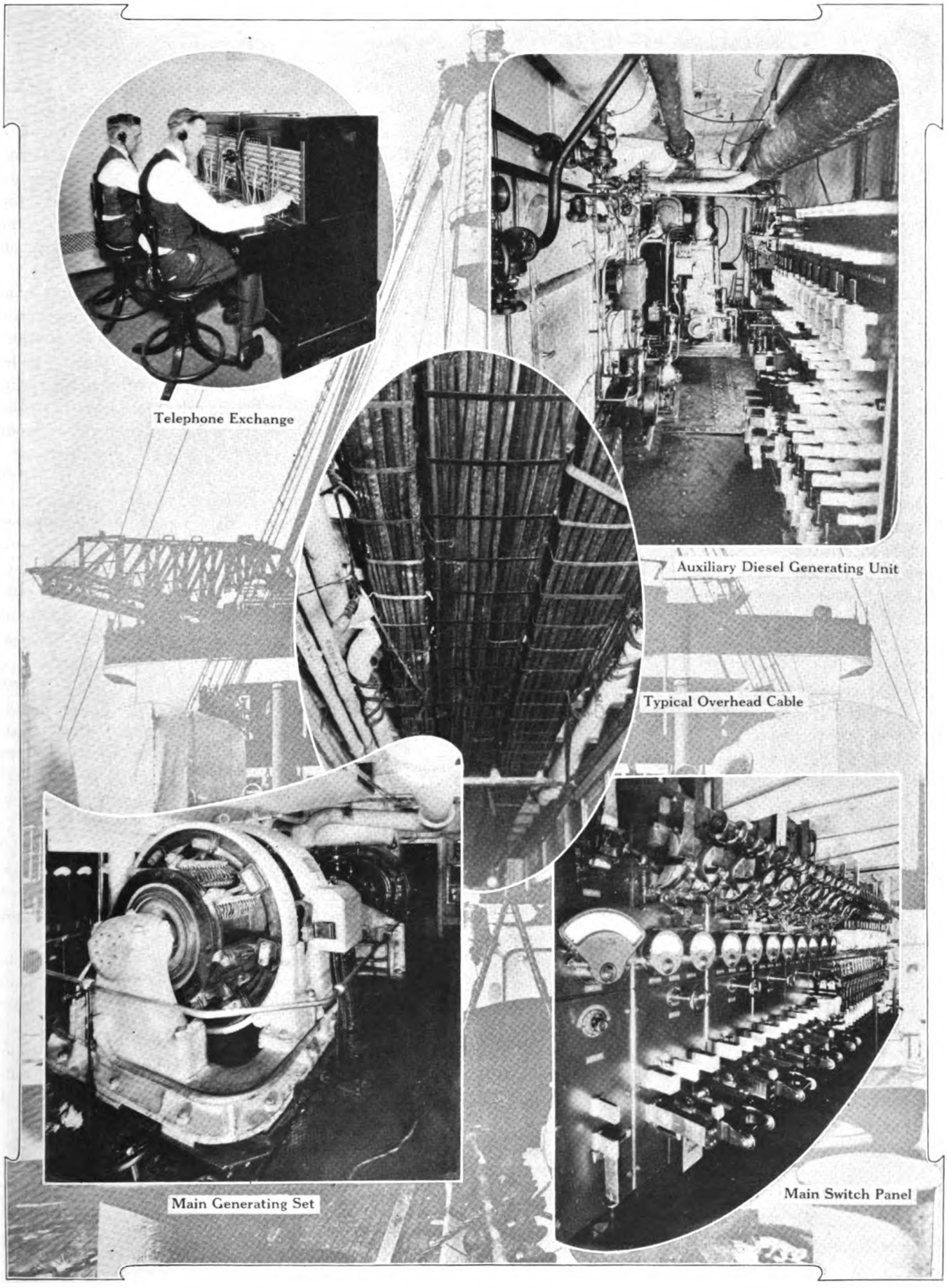
Find Many Uses for Electrical Equipment



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Meets Needs of U. S. Travelers

ONE of the first things to keep in mind when considering the keen competition now under way for an appropriate share of the transatlantic passenger-carrying trade between Great Britain and the continent of Europe on the one hand and the United States of America on the other. is that both of these general parties contribute to the travel and commerce now existing and that both must continue to contribute in the growth of this trade. Relations between these respective parties, therefore, must be friendly and cordial, particularly so as one can hardly live without the other.

It is not surprising nor unnatural that the nationals of any particular country should prefer, everything else being equal, to travel in ships owned and operated by their own countrymen. Patriotic motives or nationalistic feeling will not and can hardly be expected to go to the extent of patronizing inferior ships, accommodations and service. Great Britain and Germany in the past, particularly recognized this fact and in competing for this trade used their best brains and ingenuity and spent money lavishly to build the finest ships and to give the best possible service. Consequently at the beginning of the war, these two nations divided between them the greater part of the transatlantic business, each holding much more than the share contributed to this trade by their respective countries.

They legitimately obtained this advantage by the superiority of the service rendered. With Germany out of the running (though now coming back) that part of the business not contributed by her and even some of this, went principally to British ships. In the meantime, both France and Italy maintained transatlantic services of excellent merit and obtained a share of the business fully in proportion to their respective contributions to the trade.

Americans Forced to Use Foreign Ships

All through this period while the nations of Europe were obtaining their hold on the carrying trade from and to the United States, Americans wishing to go abroad had no choice; they were practically compelled to travel on foreign ships. The few American ships running transatlantic were old and obsolete compared with the modern liners of the European nations and were entirely inadequate in number and size to accommodate the volume of business contributed by the United States.

With the establishment of an American transatlantic service by the shipping board, operated by the United States Lines, a determined effort is now being made to provide adequate ships and accommodations under the American flag. The ships at present in this service are the best that could be obtained but are hardly equal to the fine ships in the foreign lines. The two largest and most appropriate ships operated in this line are the GEORGE WASHINGTON and the AMERICA. Both of these ships have proved popular and have done fine service to establish this American line as a factor in transatlantic travel. With the AMERICA recently thoroughly reconditioned and fitted out she will prove increasingly popular and should continue in the future as in the past a successful ship. The remainder of the ships under the United States Lines are smaller and most of them were laid down as combination transport and cargo ships during the war and completed as passenger and freight ships. Though smaller and not in the same class as the finest Atlantic liners, these ships have also proved popular and passengers have been greatly pleased with the comfortable, convenient accommodations and excellent service given.

U. S. Travelers Now Have Finest Ship

On the completion of the LEVIATHAN and her entry on July 4 into the transatlantic service as a unit of the United States Lines' fleet, all odious comparisons as between at least this ship and the finest ship of any transatlantic line under any foreign flag will have no basis in fact. This will mean that Americans will be represented in this trade by a ship in every respect equal to the very best of any foreign line, and that in so far as one liner is able to meet the demands, Americans may travel to or from Europe under their own flag with conditions at least as favorable if not actually more so than those of foreign lines. The LEVIATHAN, the GEORGE WASHINGTON, the AMERICA and the PRESIDENT BUCHANAN, now undergoing elaborate reconditioning, will form a substantial nucleus for a transatlantic line worthy of representing America in this trade. With continued operation and rendering the highest class of service, a permanent successful future may be confidently expected for this venture.

Two additional new ships, designed and built in the light of all past experience is planned to augment this fleet by the shipping board if the funds are made available by congress.

Friendly foreign nations, though not enthusiastic about America's entry into their trade with her, which they now so largely control, will recognize even though they combat the plain, economic wisdom of the attempt to obtain a fair part of this trade. In time they will accept the situation with good grace and agree that there is or will be trade enough and glory enough for all, and welcome this comparative youngster into the most highly developed communication route in the world.

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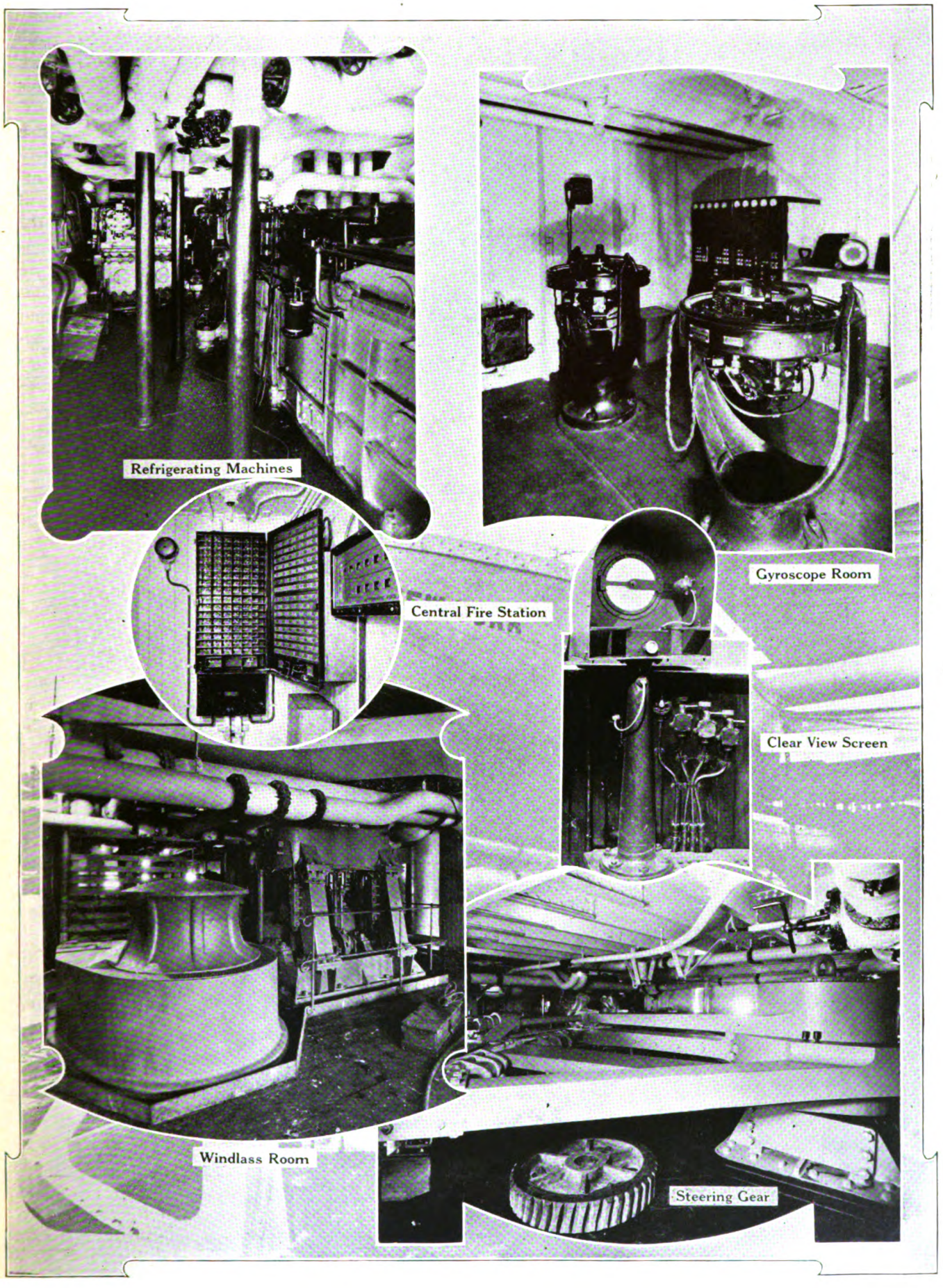
Ship Reveals Latest Engineering Skill



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IN THE alcove shown above, is but a hint of the majestic beauty and elegance of the main dining saloon. Here the peak of artistic simplicity is reached and here it is altogether fitting ORSENIGO CHAIRS and TABLES should have been chosen to contribute to the comfort and enjoyment of those who choose to journey on the greatest American Liner. — THE ORSENIGO COMPANY, LONG ISLAND CITY, N. Y.

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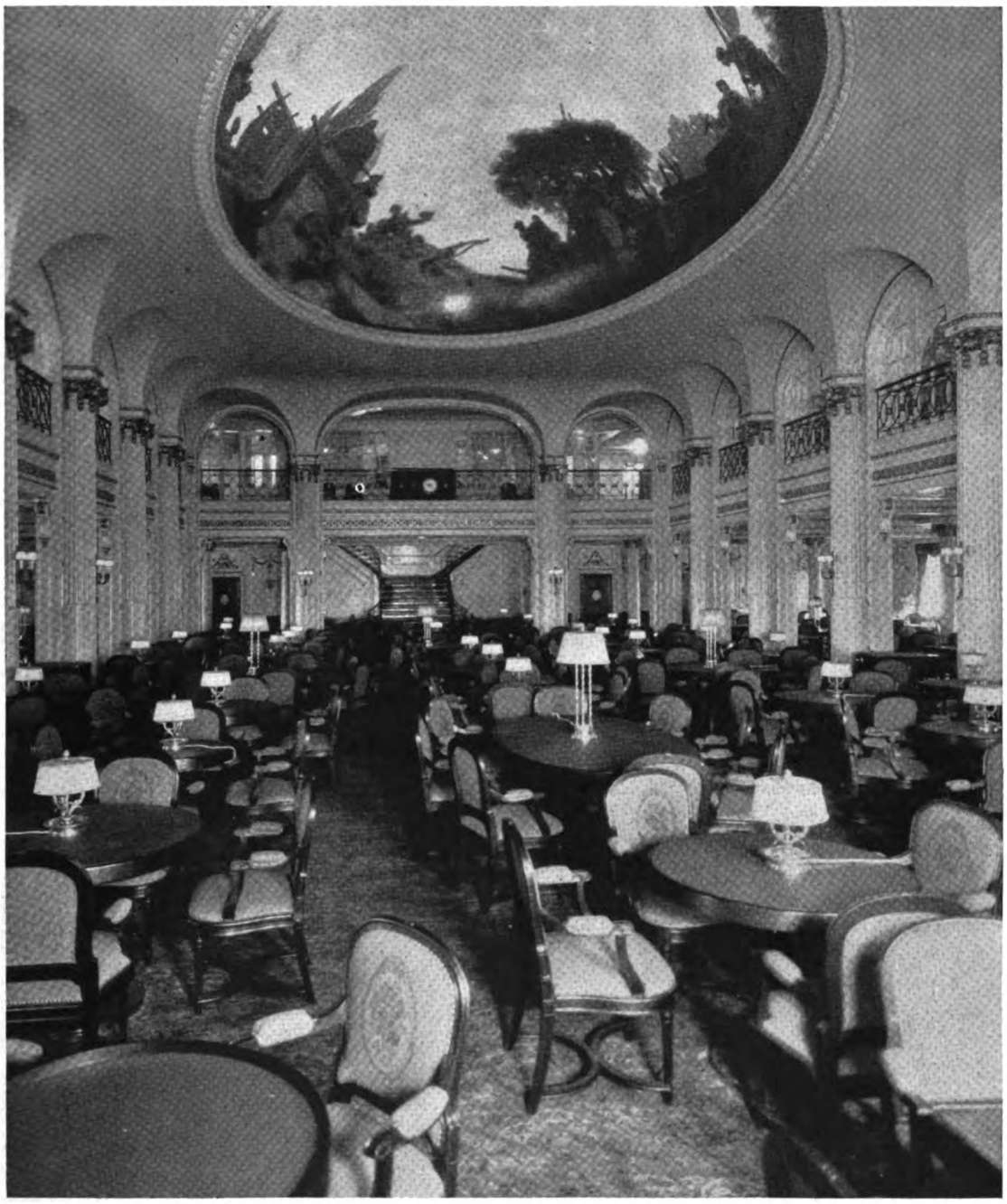

IN ITS luxury of appointment and exquisite taste of decoration the main dining saloon brings to mind the atmosphere of the most exclusive metropolitan clubs and restaurants. Extending the full width of the ship, it is difficult to visualize the tremendous size or remarkable beauty of this room. Particularly worthy of note are the walnut tables, of special design, and the unusually distinctive chairs, both designed and made by THE ORSENIGO COMPANY, LONG ISLAND CITY, NEW YORK.

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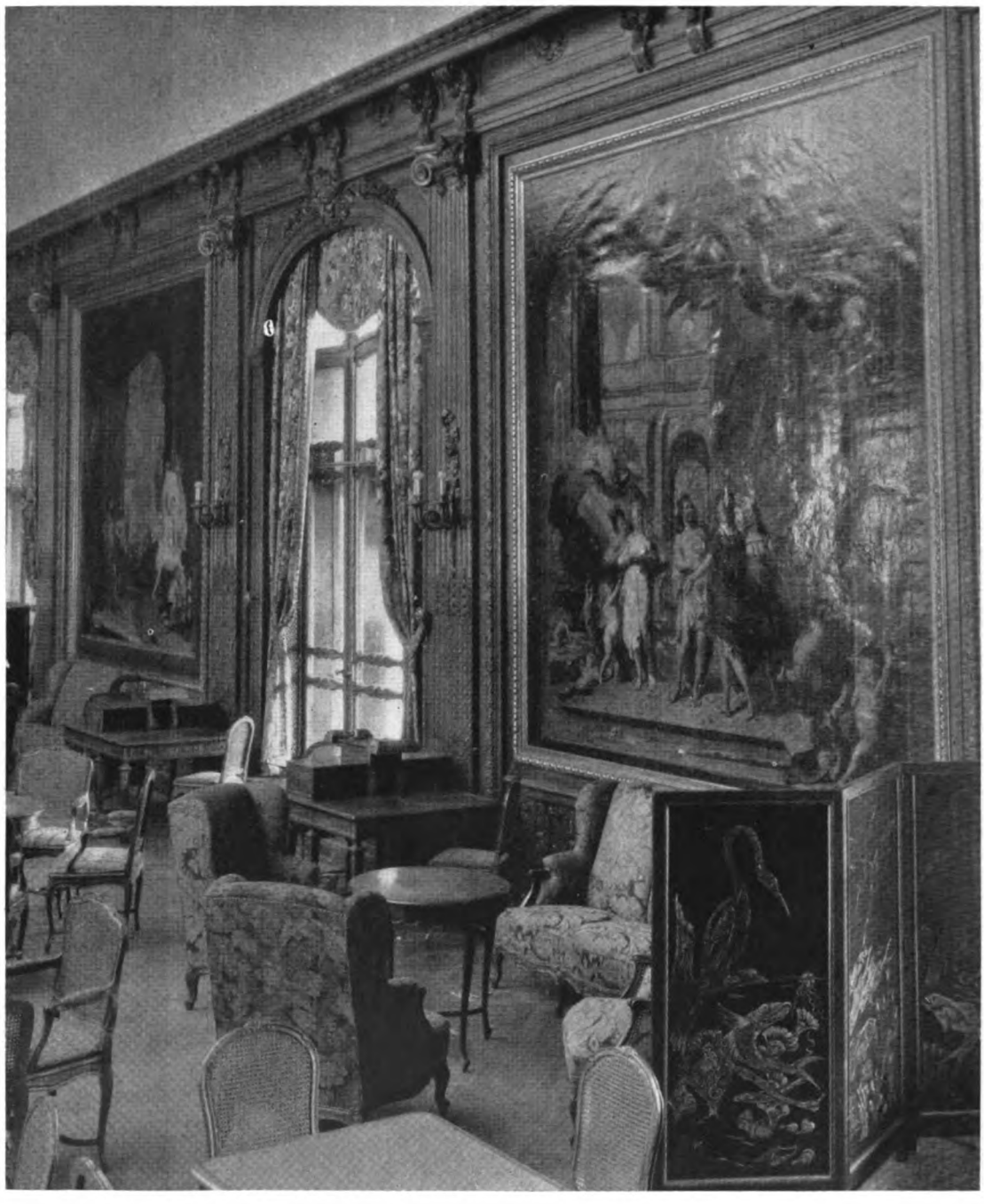

NO PHOTOGRAPHIC reproduction accurately can portray the beauty and distinction of this magnificent Social Hall. It is the center of life aboard ship. Day and night it is the scene of brilliant gatherings of prominent people. Fully in harmony with the spirit of the room, and in a large measure responsible for its beauty and comfort, are the many types of especially designed ORSENIGO chairs, tables and settees. THE ORSENIGO COMPANY, LONG ISLAND CITY, NEW YORK.

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RARELY is it possible to find perfect comfort and elegance so happily joined as in this the Ladies' Tea Room. Proclaimed by many the most beautiful room aboard ship, with each chair and table of American Oak acknowledged works of art in themselves—still there radiates from this room a suggestion of absolute comfort, and an invitation to the complete relaxation so necessary to the perfect vacation. The designing and making of this furniture is, indeed, a source of pride to us. THE ORSENIGO COMPANY, LONG ISLAND CITY, NEW YORK.

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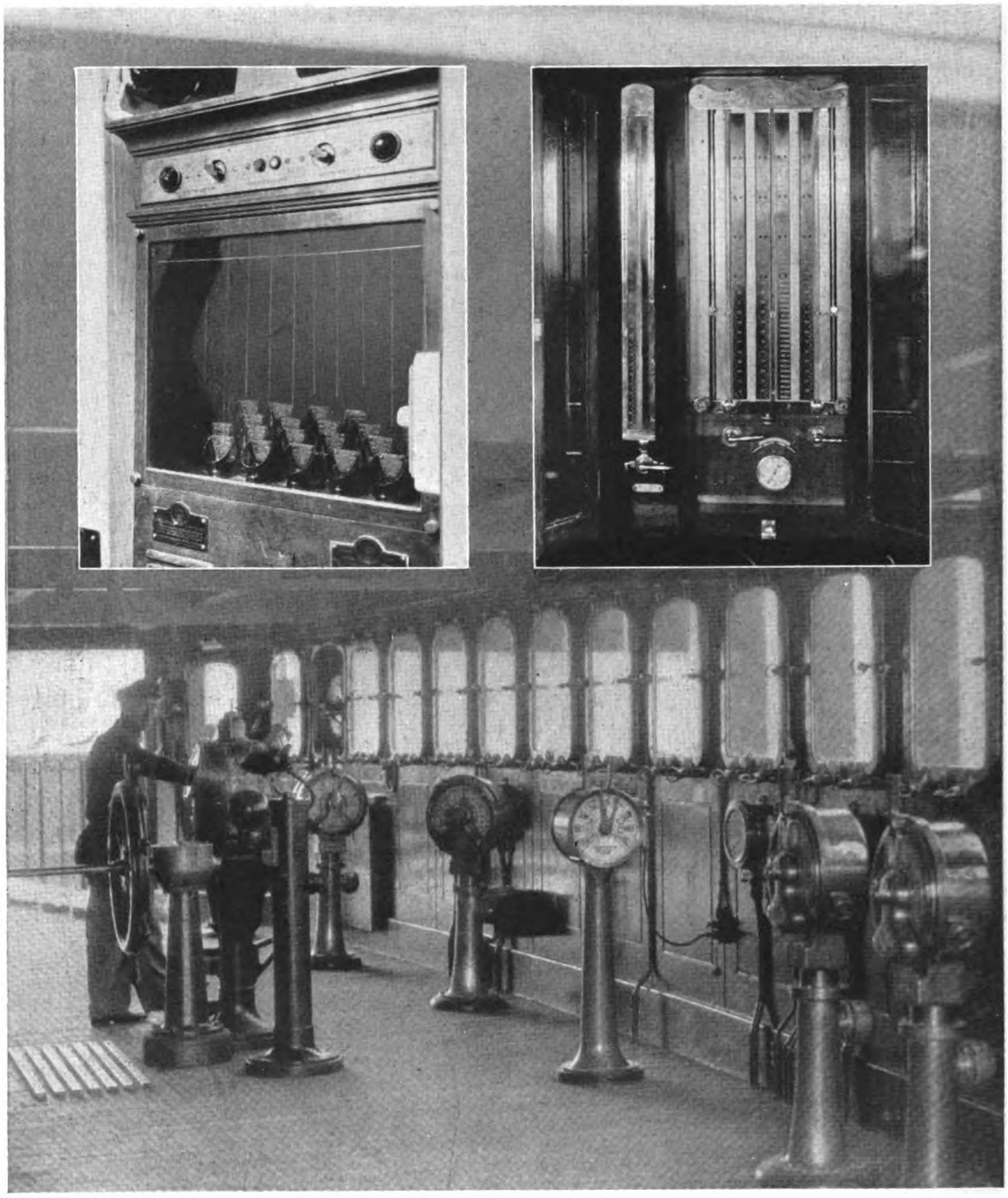

IN THE reconditioning of the LEVIATHAN it is interesting to note the contrasting use of Copper, Brass, and Bronze in precision apparatus such as is shown here and in the heavier operating machinery, both of which types of equipment literally depend upon Copper's qualities for their efficiency. COPPER AND BRASS RESEARCH ASSOCIATION, 25 BROADWAY, NEW YORK.

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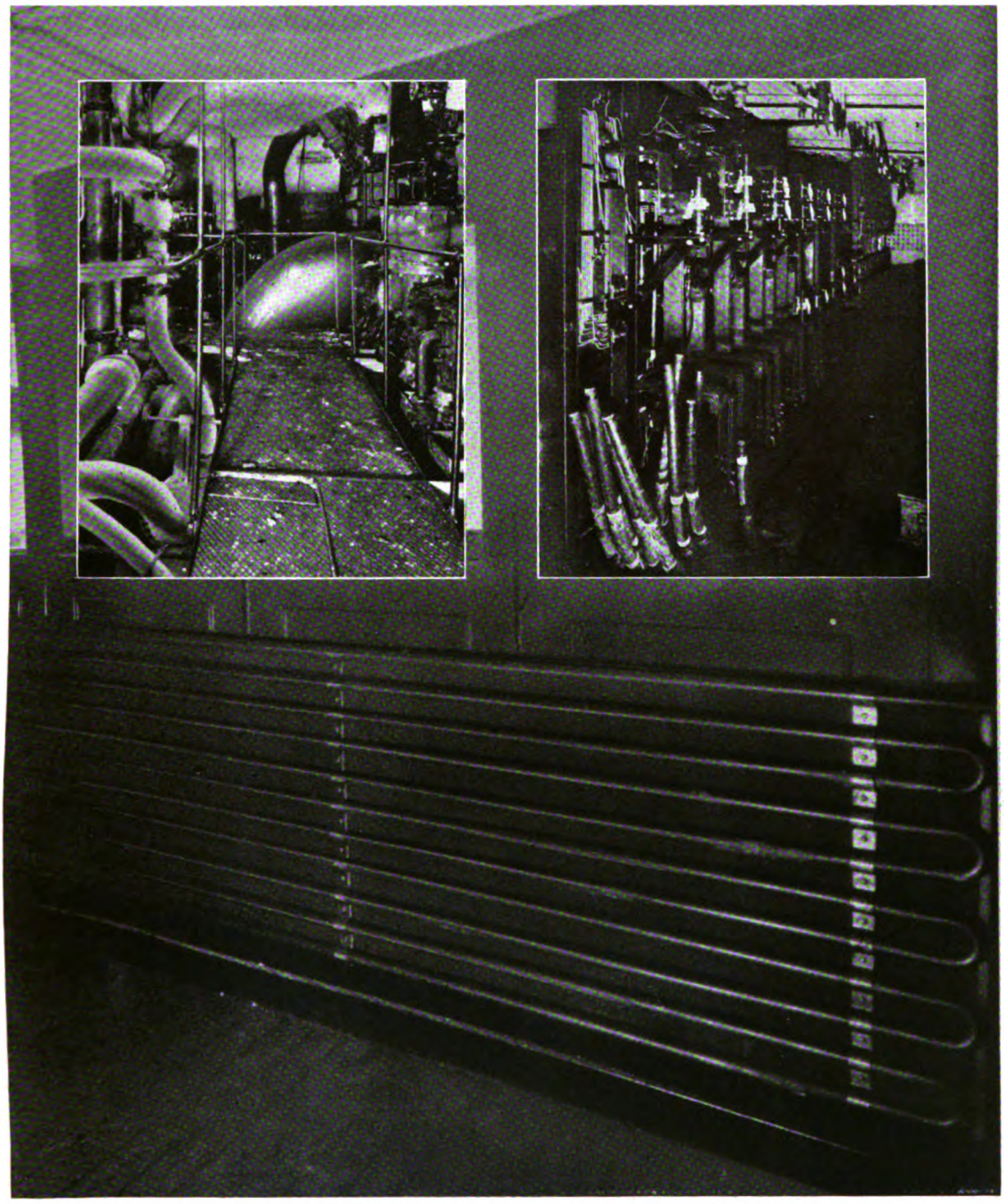

IT IS significant that this triumph of marine engineering incorporates a tremendous amount of Copper, Brass and Bronze. On this page are shown the low pressure turbine Copper circulating delivery pipe, the rear of the main switchboard, and one of the Copper heating coils used throughout the LEVIATHAN.
COPPER AND BRASS RESEARCH ASSOCIATION,
25 BROADWAY, NEW YORK.

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IN THE finest home, or in the most magnificent metropolitan hotel, where could be found a glimpse of greater elegance and beauty than here, at the entrance to the social hall? Thoroughly in keeping with the general scheme, and illustrating perfectly the artistic possibilities of perforated metal, are the metal grids at each side of the doorway. These, in company with the metal grids and casings in many other parts of the ship, were made by THE BECKLEY PERFORATING COMPANY, GARWOOD, N. J.

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THE STEINWAY GRAND was selected for the stage in the social hall of the Leviathan, and the Steinway upright for the first class dining room.

Quality of tone, distinctive design and the most expert and careful workmanship characterize the Steinway pianos.

STEINWAY & SONS, NEW YORK, N. Y.

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MAIN Dining Saloon—Steamer Leviathan—Carpets supplied by ALEXANDER SMITH & SONS CARPET CO., NEW YORK— *Main Dining Saloon—Ritz Carlton Rest Room—Winter Garden—Tea Room—Library—Social Hall—The Ways.*

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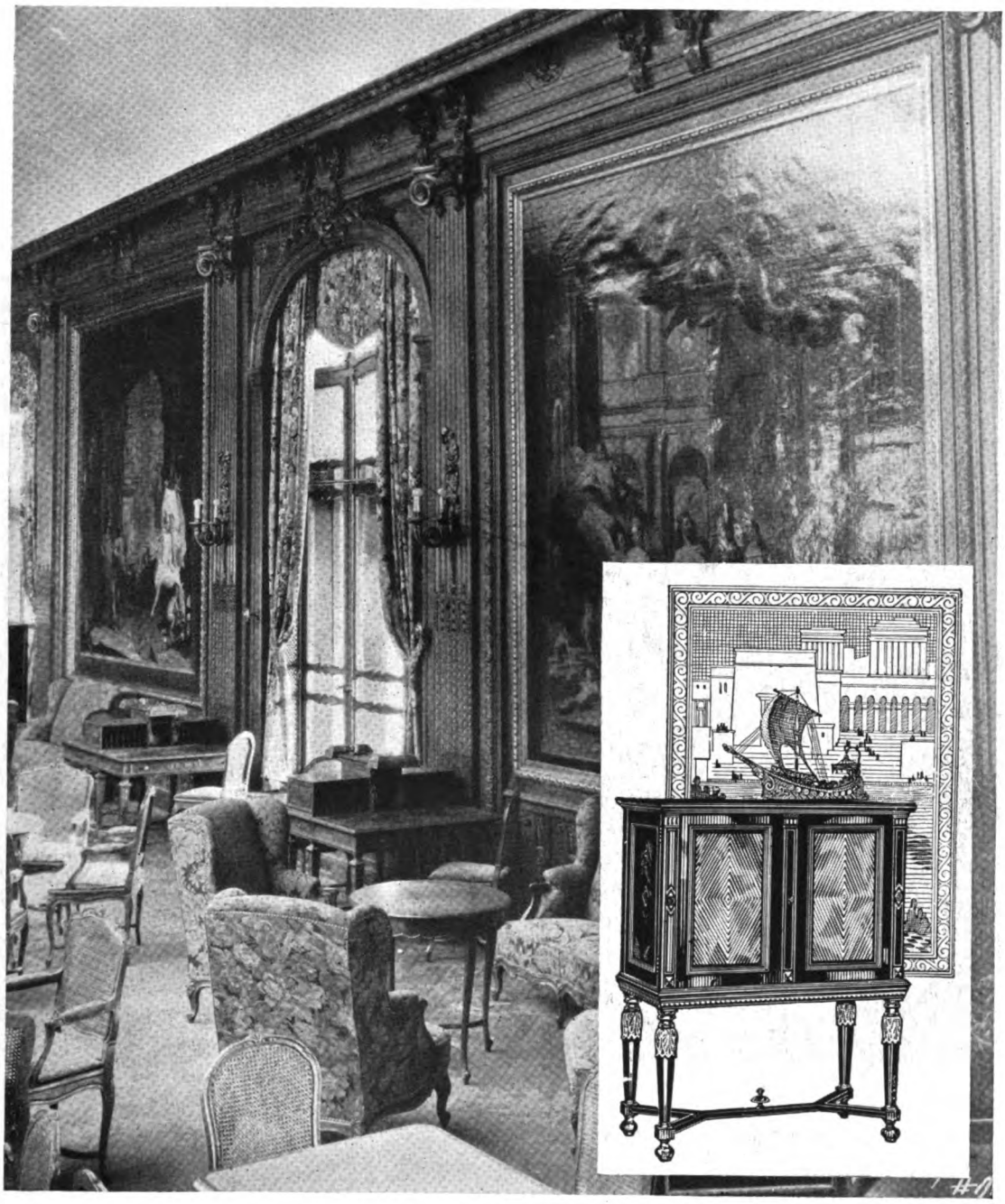

IT IS a fact significant that the "LEVIATHAN", greatest of ships, is equipped with BRUNSWICK Phonographs. Perfection in reproduction, beauty in design, fidelity in performance, are indeed factors that give distinction to BRUNSWICK Phonographs.— BRUNSWICK, BALKE, COLLENDER COMPANY,— CHICAGO AND NEW YORK.

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CAPTAIN HARTLEY taking a bearing with the Sperry Bearing Repeater. The Sperry gyro-compass system aboard the LEVIATHAN consists of two master compasses and seven repeater compasses. Likewise, Captain Hartley will enjoy the use of the Sperry 450,000,000 candle power, high intensity searchlight—the most powerful on any merchant vessel. THE SPERRY GYROSCOPE COMPANY, BROOKLYN, N. Y.

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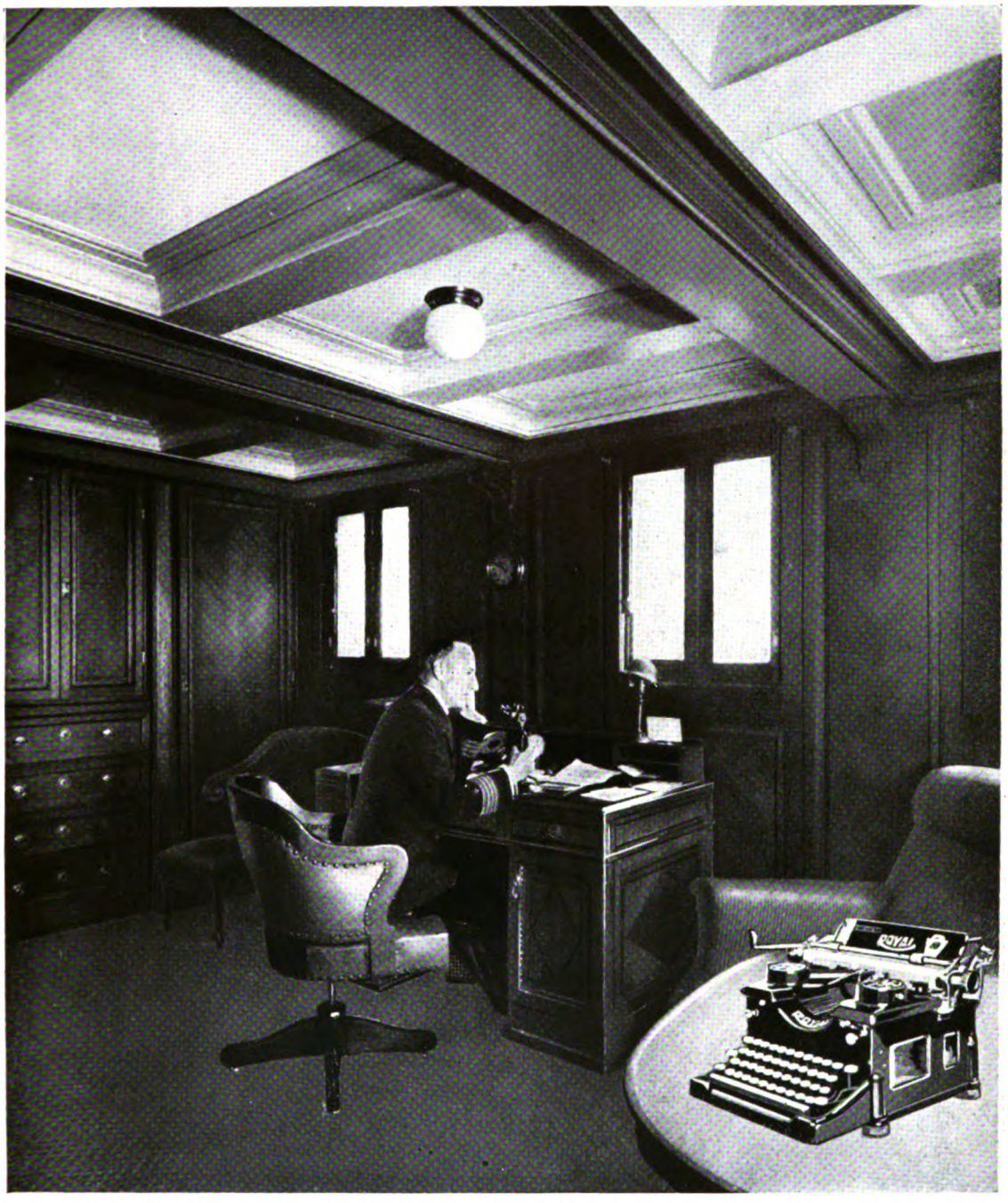

THE ROYAL Typewriter is the finishing touch to that office efficiency which an aggressive business organization must have on land or sea. It fits so exactly into the high standard of organization aboard the Leviathan that it was the only typewriter selected for this great ship. ROYAL TYPEWRITER COMPANY, INC., N. Y. CITY. BRANCHES AND AGENCIES THE WORLD OVER.

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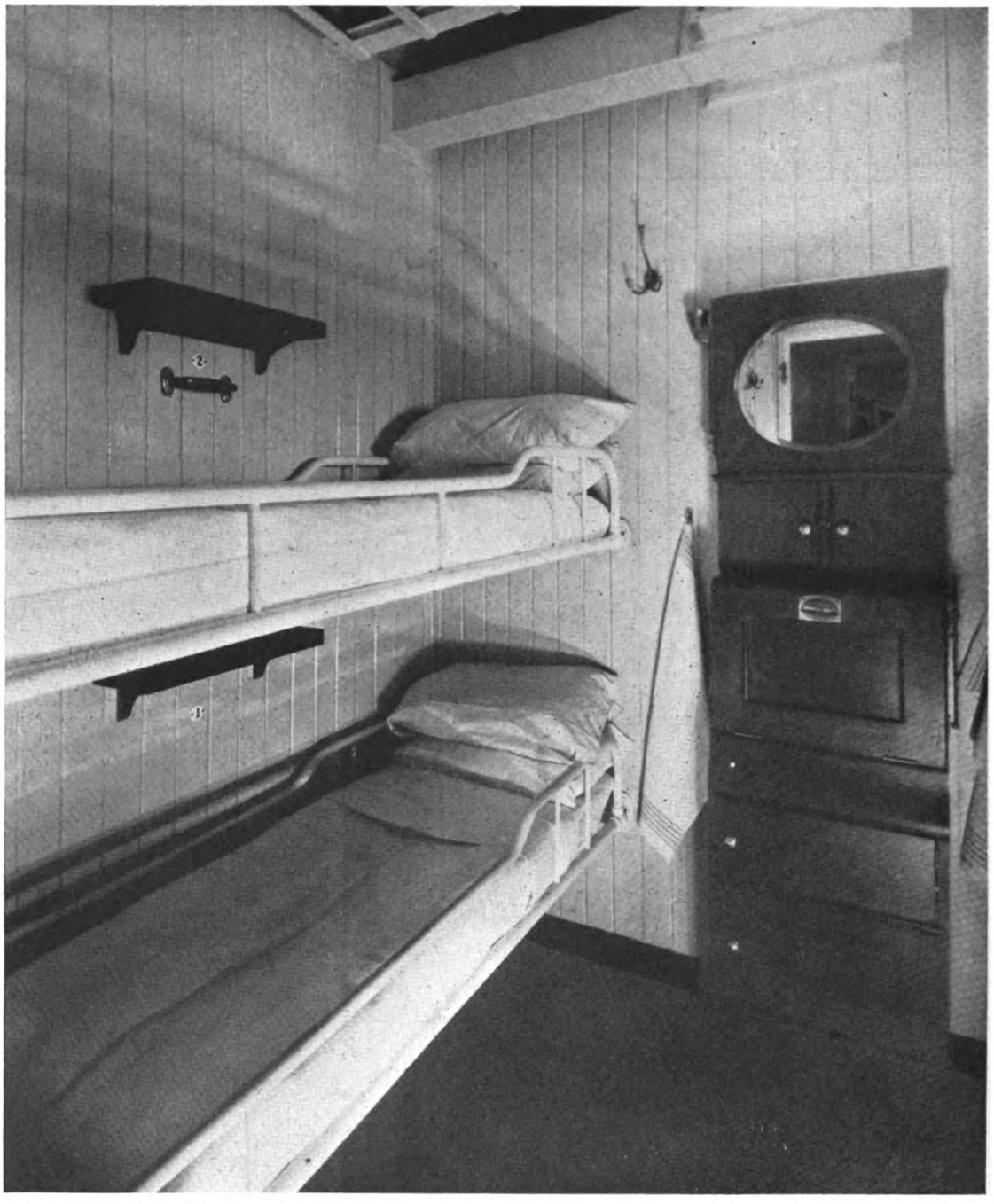

PRESENTING a perfect combination of comfort, cleanliness and durability it followed as matter of course that SOUTHERN-ROME PIPE BERTHS and SPRINGS were chosen for use on the LEVIATHAN. The third class stateroom shown here, as well as hundreds of other third and fourth class staterooms were SOUTHERN-ROME EQUIPPED. SOUTHERN-ROME SPRINGS also were selected for first and second class beds.
SOUTHERN-ROME CO., BALTIMORE, MD.

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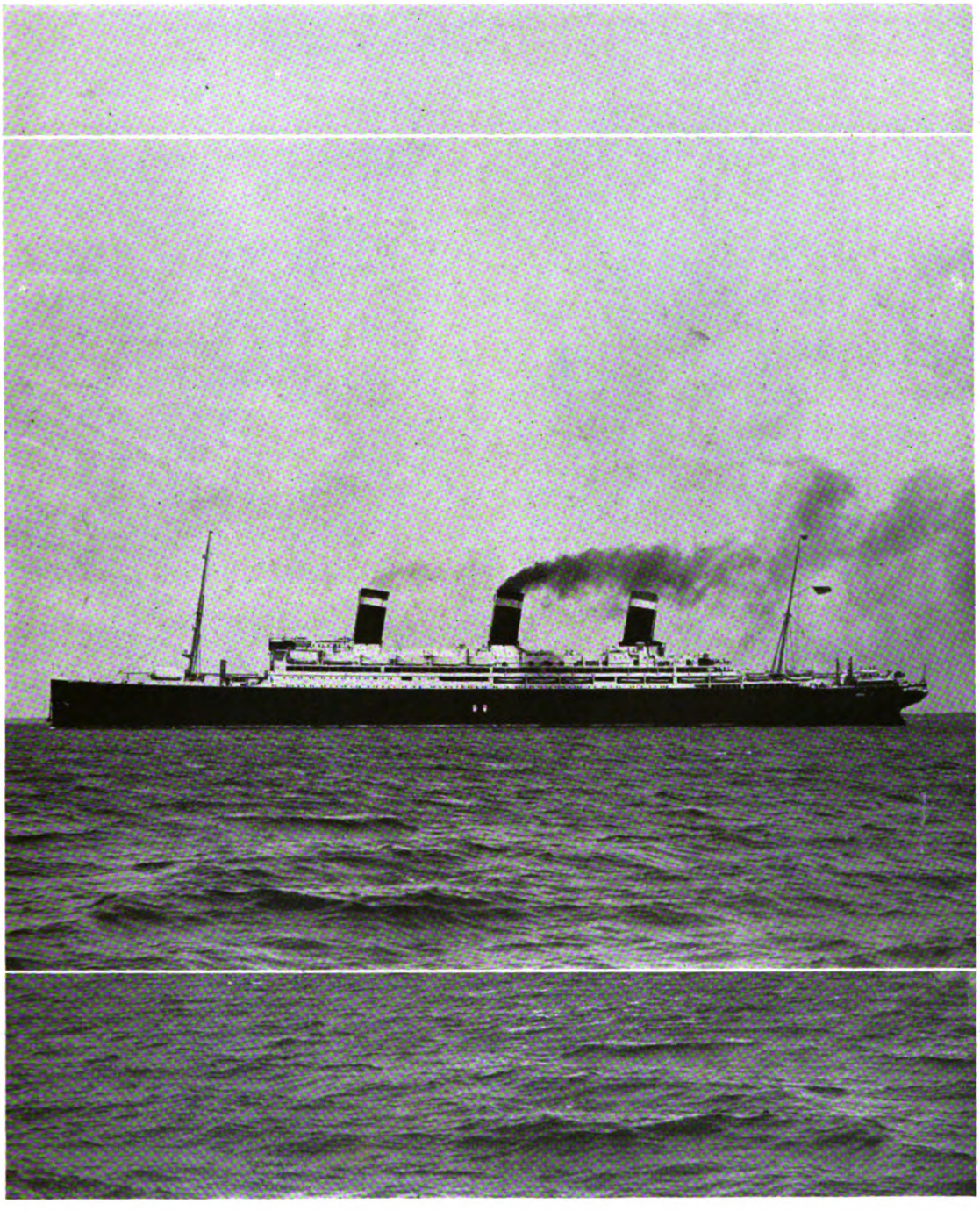

WHEN the SS LEVIATHAN sails from New York July 4th to Cherbourg and Southampton the largest ship in the world joins the greatest American fleet. The next sailings will be July 28th, August 18th and September 8th from New York; homebound from Southampton and Cherbourg July 17th, August 7th, August 28th and every three weeks thereafter. UNITED STATES LINES MANAGING OPERATORS FOR THE UNITED STATES SHIPPING BOARD.

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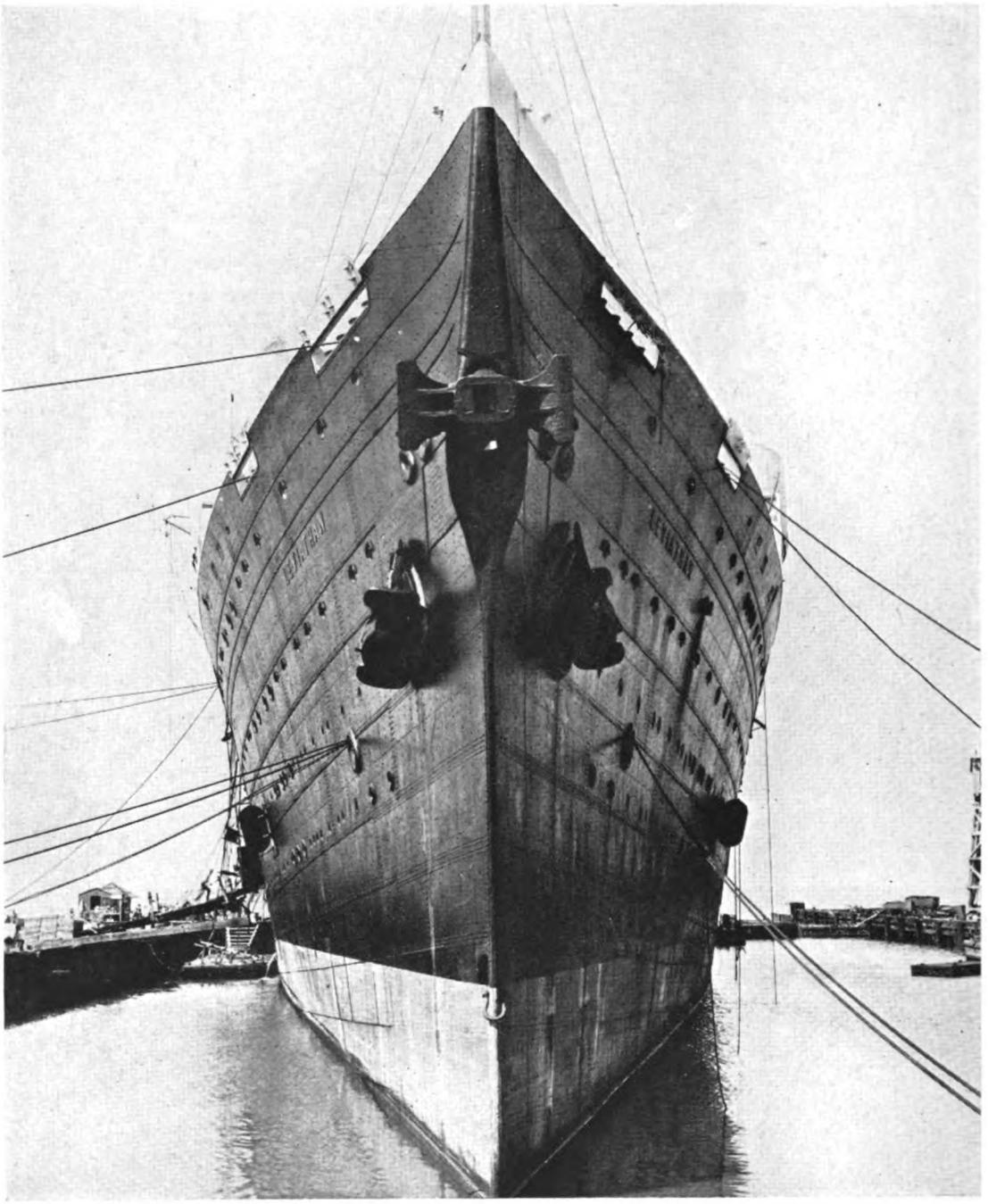

THE DUNN Stockless Anchor for the "S.S. Leviathan" of the United States Shipping Board was manufactured by the Thurlow Works of the American Steel Foundries, Chester, Pennsylvania. The weight of this anchor is 33,300 lbs.
AMERICAN STEEL FOUNDRIES, GENERAL OFFICES, McCORMICK BLDG., CHICAGO, ILL.

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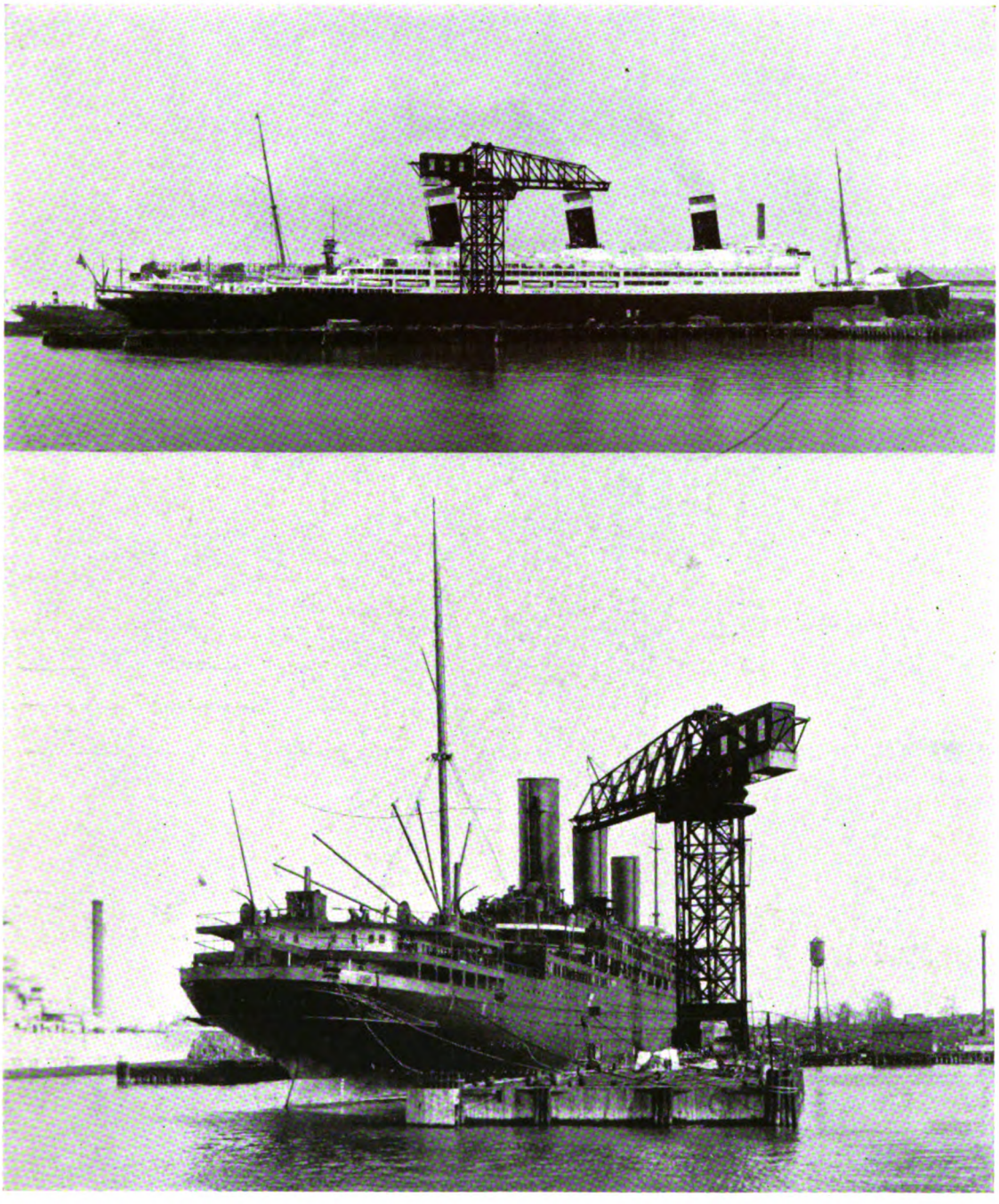

THE McMYLER-INTERSTATE 120-ton revolving hammer-head crane shown here contributed largely to the speed and efficiency with which the reconditioning of the LEVIATHAN was done. It is the second largest in the country. The lift of the main hoist is made in one revolution of the drum and a rapid auxiliary hoist making the crane suitable for new construction as well as fitting out, is provided. THE McMYLER-INTERSTATE CO., BEDFORD, OHIO.

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A HALF-HORSE power motor, running at 1700 R. P. M., twenty-one feet of steel wire flexible shaft and metal casing, carrying a steel wire brush, was the equipment used to clean the tubes of the Modified Yarrow Boilers—a dry cleaning job, a great economy in labor cost and a complete success. Complete information on request. THE S. S. WHITE DENTAL MFG. CO., FLEXIBLE SHAFT DEP'T, 84 MARKET ST., NEW YORK.

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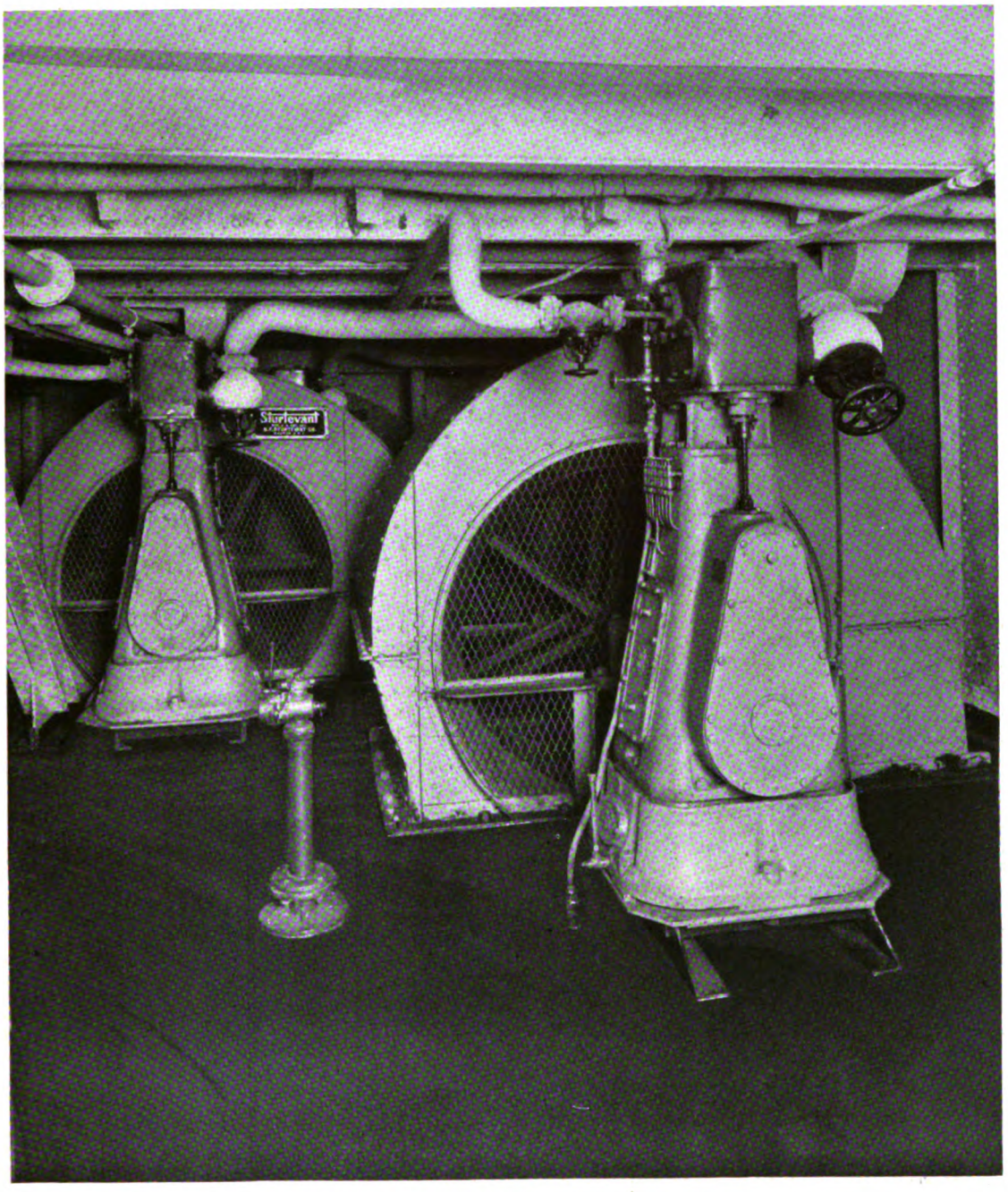

WHEN it was decided to change the ship to an oil-burner, Sturtevant engineers were called upon to design the Forced Draft apparatus. The result was eight Multivane Fans, each direct connected to an 8 x 7 VS7 Engine. Each of these blowers delivers 45,000 cubic feet of air per minute.

Ventilation of the engine room, fire room, galley, baths, and other parts of the ship, is accomplished by Sturtevant Ventilating Fans driven by Diehl Motors. The Air is changed about every five minutes.—B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

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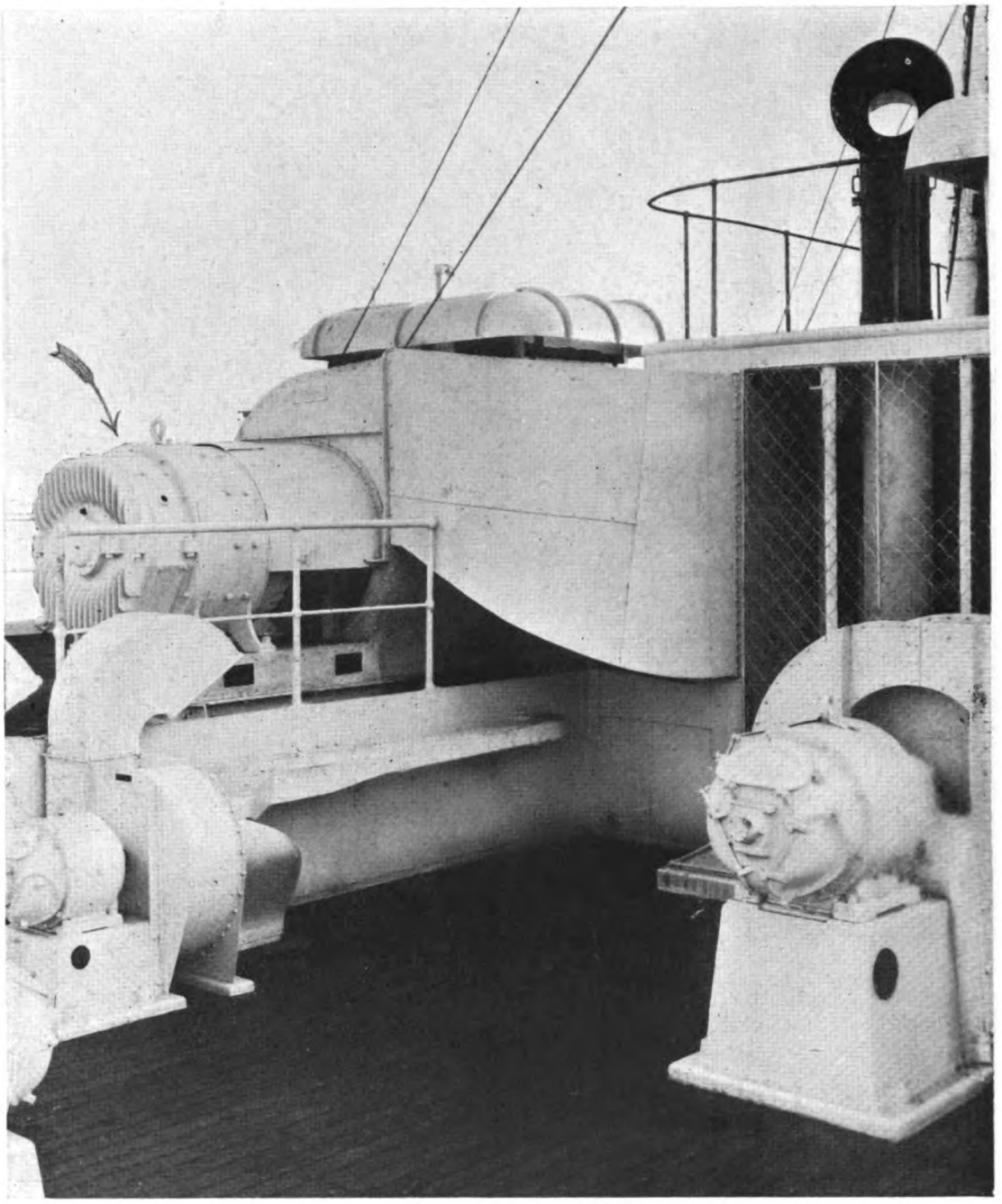

AFT ON upper deck you find the "DIEHL" type K-15 marine motor shown here, driving a 60,000 cu. ft. ventilation blower. This is a 50 H.P., 110 V., 360/475 R.P.M. of the enclosed, waterproof, ball bearing, continuous duty type. In addition to the 34 motor driven ventilation blowers, "DIEHL" motors are also installed on the LEVIATHAN in connection with the fire extinguishing system and the DeLaval Oil Purifiers. DIEHL MANUFACTURING CO., ELIZABETH, N. J.

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SERVING the shipping industry for a hundred years it follows naturally that PLYMOUTH ROPE should be chosen for use on the Leviathan. This view of the forward deck shows but one of the many places in which you will find "the rope you can trust" ready to meet all emergencies. — PLYMOUTH CORDAGE COMPANY, NORTH PLYMOUTH, MASS.

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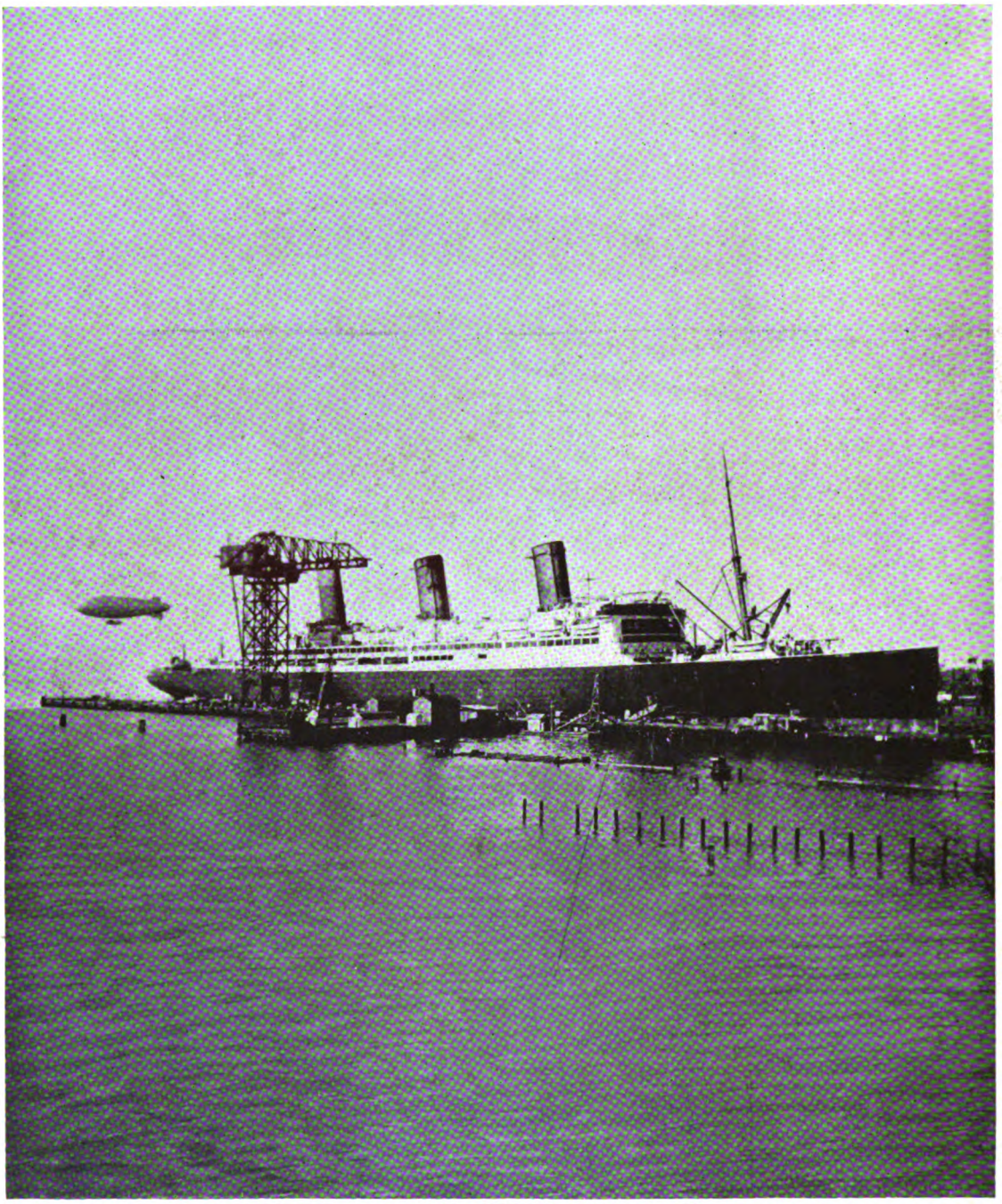

THE LEVIATHAN at the plant of the Newport News Shipbuilding and Dry Dock Company undergoing reconditioning. The painting, decorating, joiner work, wood carving, plumbing, electric work, heating and ventilating and reconditioning of furniture, applique, and enameling work, machinery and fuel oil installation and all general work carried out by the working force of the NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO., NEWPORT NEWS, VA.

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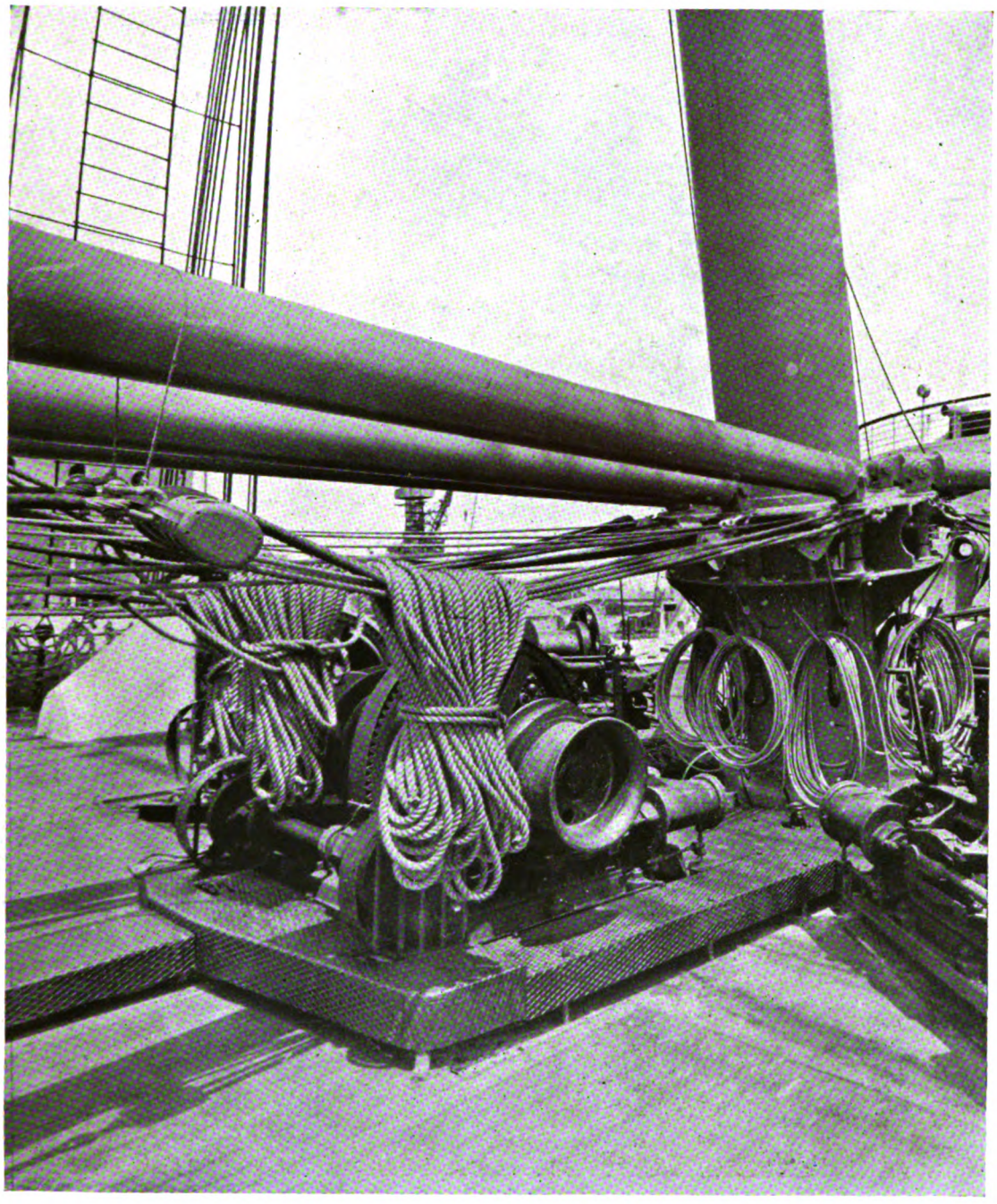

IN THOSE places on the LEVIATHAN where strength and durability are of paramount importance—there you will find Columbian TAPE-MARKED Pure Manila—the Guaranteed Rope, in use. — COLUMBIAN ROPE COMPANY, AUBURN, *"THE CORDAGE CITY"*, N. Y.

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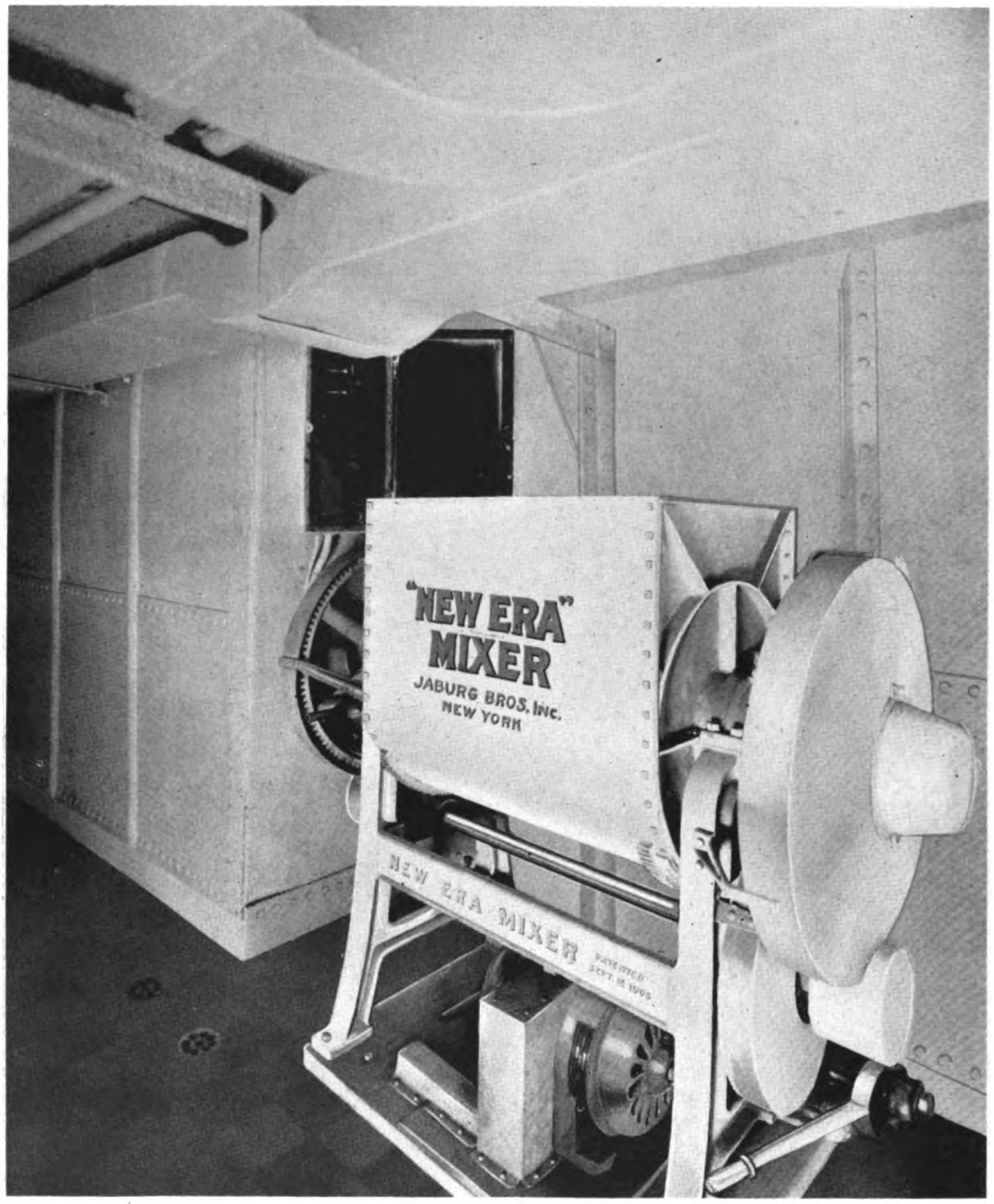

CONFORMING with the high grade equipment used throughout the largest and most palatial vessel afloat, the bakery of the Leviathan contains the very latest and most efficient machinery. It is therefore but natural that Jaburg Brothers, Inc. of New York, acknowledged to be the leading firm in the Bakers Supply Field should be selected to supply this equipment.

The machine shown above is the Patented New Era Dough Mixer, for which the manufacturing and selling rights for prescribed territory and sizes are controlled by JABURG BROTHERS, INC., of 10 LEONARD STREET, NEW YORK CITY.

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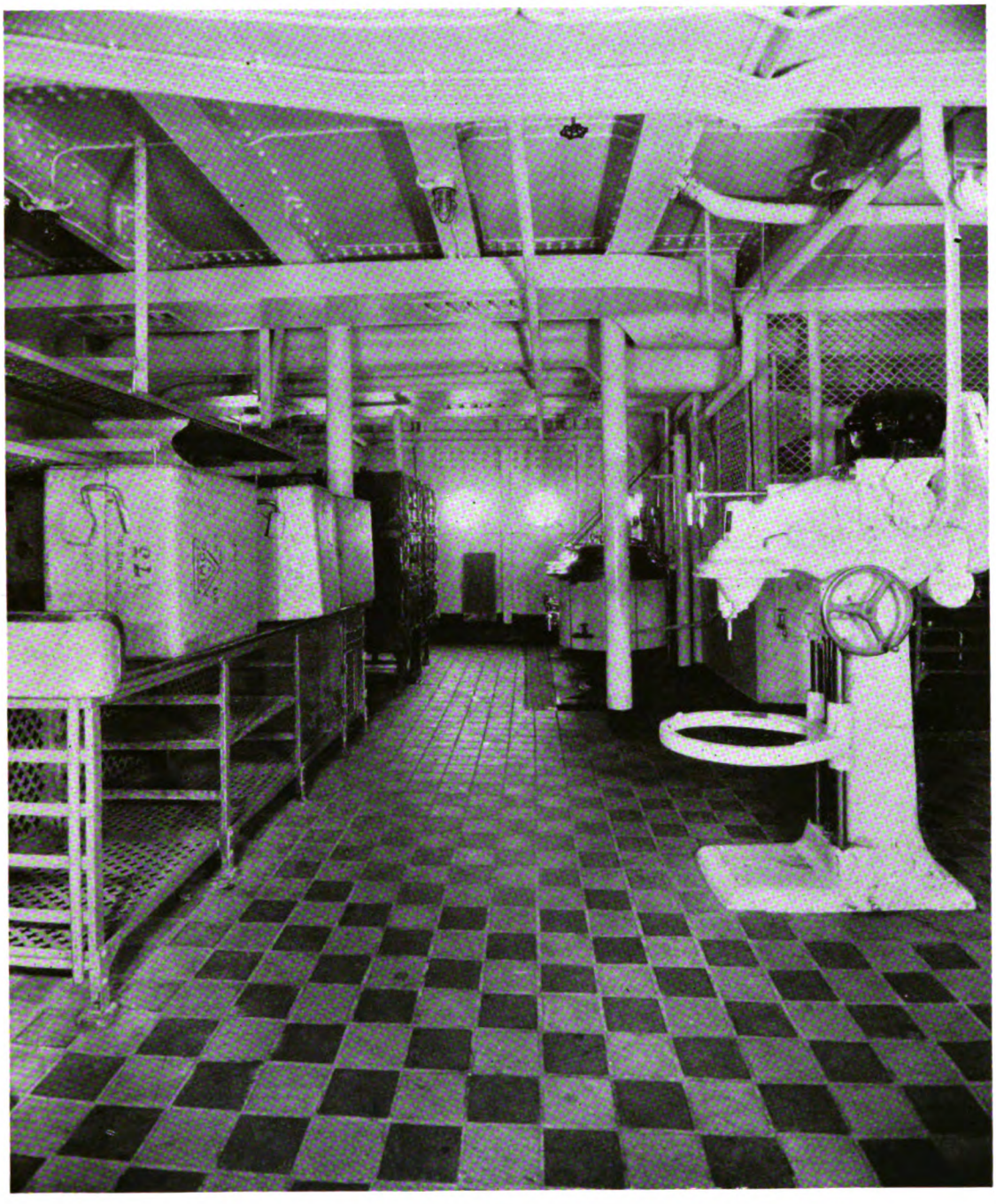

WHERE cleanliness is king—the galley of the main dining saloon. Here the sumptuous abundance of food, for which all the United States Lines Ships are noted, is prepared under the supervision of world-famous chefs, and here "ARMCO" INGOT IRON assumes a position of outstanding importance in the making of many of the warming ovens and containers used aboard the Leviathan. THE AMERICAN ROLLING MILL COMPANY, MIDDLETOWN, OHIO.

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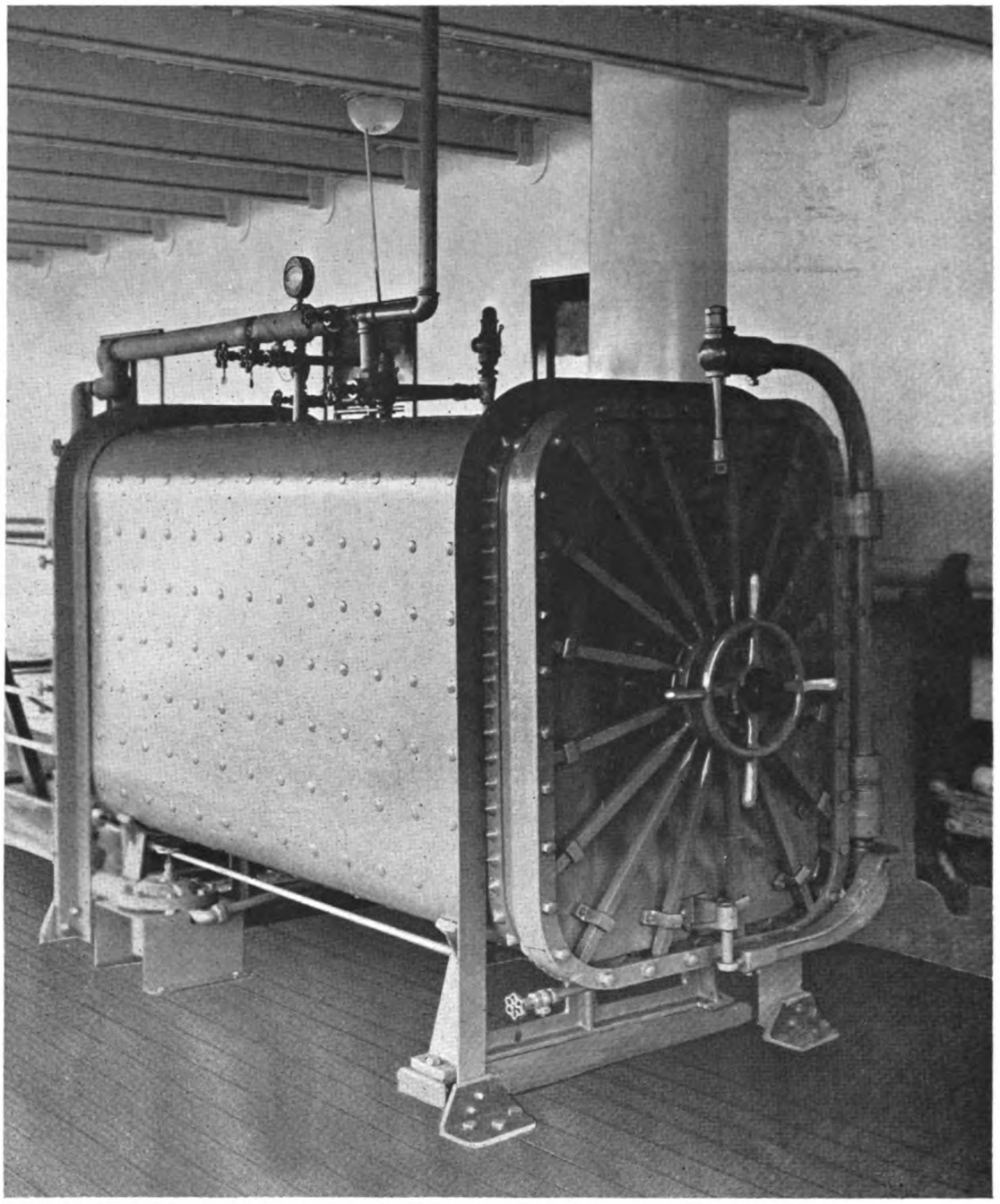

THOROUGHLY in keeping with the policy of the U. S. Shipping Board that none but the finest products of American Manufacturers should be represented on board the LEVIATHAN is the STERILIZER DISINFECTOR shown above. Destined, as it is, to fulfill an important function in safeguarding the lives of passengers and crew, there could be no question regarding the reliability or efficiency of this equipment. And on the basis of sheer merit the specification of the "AMERICAN" KINYOUN-FRANCIS U. S. NAVY TYPE followed as a matter of course. AMERICAN STERILIZER CO., ERIE, PA., EASTERN SALES OFFICE, 200 FIFTH AVE., NEW YORK CITY.

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LEVIATHAN

SOME INTERESTING FACTS AND FIGURES

MILES of linens, mountains of silverware and glassware, and acres of china and other articles, enough to supply a town of several thousand population, were required for the Leviathan, and, with the exception of the linens, all were of American Manufacture in keeping with the policy of the United States Shipping Board.

AS one of the original contractors with the Government, Gimbel Brothers were chosen to furnish the library, the furnishing and supplies for the dining rooms, galley and restaurant, as well as the linens, blankets, and other supplies for staterooms and crew. To produce the vast quantity of widely assorted products required, arrangements were made with more than 200 sub-contractors throughout the country.

UNUSUALLY strict specifications covered each article needed and these specifications were carried out to the minutest detail. Gimbel Brothers, in order to insure perfect system in delivery, secured a warehouse on the waterfront at Boston, laid this out to conform as nearly as possible to the space aboard ship, inspected each shipment as it arrived and stored it in its proper place. When the Leviathan came to Boston for drydocking, everything was ready for immediate delivery and supplies were put aboard and installed in record breaking time. The trucks used in their delivery made a line twice as long as the vessel itself.

IN the final check-up it was found that not a case or crate was missing, and though tons of delicate china and glassware were handled, often over hundreds of miles, the breakage was trifling.

NEARLY five tons of metal were required for the 50,000 pieces of flat silver and about as much more for the 9,000 to 10,000 pieces of hollow-ware. Laid end to end, the silverware, made by R. Wallace & Sons Co., Wallingford, Conn., would cover a stretch of more than seven miles, with some to spare. Raised into the air it would mount to seventy times the height of the Washington Monument, or would tower 9,000 feet above Mt. Everest, the highest mountain peak. A ton and a half of nickel silver wire and 650 feet of solid silver nickel rod were used in making the mounts and other applied parts.

Each piece of silver, china and linen bears the Leviathan crest, specially designed.

FOR the various dining rooms, 102,000 pieces of china have been provided. There are five different services for the several classes of passengers, officers and crew, the chinaware differing only in weight and decorations. Forty tons of clay and several tons of flint and spar have gone into its manufacture. Very thin china with coin gold and royal blue decorations will be used for the Ritz restaurant, and the *a la carte* service. For the first-class passengers the china is of very attractive plain-edged ware with underglazed decorations. The individual coffee and tea pots, sugar bowls and creamers are of rich cobalt blue. Vitrified cooking china is used for the great dining-room and restaurants.

THERE are 52,000 pieces of glassware, ranging from the dainty tumblers, etched with the ship's crest, up to the elaborate cut glass in handsome effects.

MORE than 75,000 yards of the finest linens have been used in the table-cloths, napkins, sheets, pillow-cases and other articles, these being woven in and near Belfast, Ireland, and in Dunfermline, Scotland, these being the only articles made abroad. The thousands of blankets, woven of the finest wool, were made in Minnesota. There are six-and-half miles of them. The cotton sheets and pillow-cases for second and third-class passengers would cover a path five feet wide and twenty miles long. There are nearly a thousand steamer-rugs, 600 for first-class, 350 for second-class passengers. Two thousand dozen towels were ordered from one factory, and thousands more from others. Bath-mats, laundry-bags, and other articles have been supplied by hundreds. There are 1,200 deck chairs.

THERE are seven complete galleys, or kitchens, and four complete bakeries. The equipment for galleys and pantries totals 41,857 pieces. If each separate utensil were set side by side, they would extend in an unbroken line the length of Manhattan Island.

FIVE thousand volumes are comprised in the library, which will be one of the most complete ever carried by any ship. This embraces books to suit every taste, from standard reference works to the latest popular fiction. Games of all kinds have been provided; and there are a number of pianos, phonographs and other musical instruments. With the theatre, with its well-equipped stage, and a battery of moving picture machines; the passengers will be furnished with nearly all forms of amusements found ashore.

THE original plans and model of the Leviathan were purchased in Germany by Gimbel Brothers, and this famous model, which was displayed in the Grand Central Palace during National Marine Week, is the centre now of an interesting window-display, showing various features of the greatest of steamships.

GIMBEL BROTHERS

PHILADELPHIA *NEW YORK* *MILWAUKEE*

GIMBEL BROTHERS

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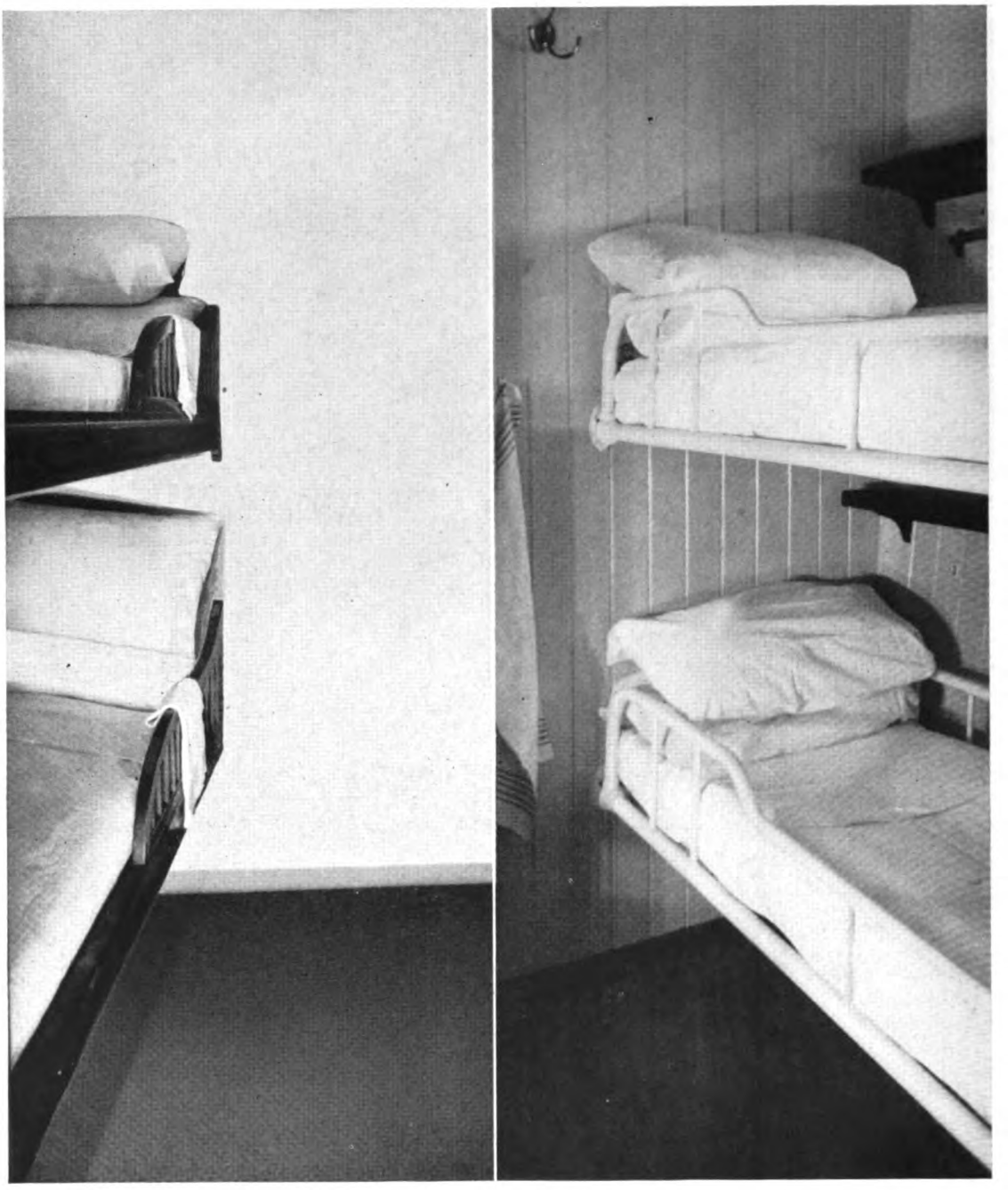
LEVIATHAN



IN ALL staterooms equipped with Cotton Sheets and Pillow Cases "UTICA" Goods were the choice, being recognized for their splendid wearing qualities and attractive appearance. For years these same characteristics have marked all goods made by the UTICA STEAM AND MOHAWK VALLEY COTTON MILLS, UTICA, NEW YORK.

GIMBEL BROTHERS

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Social Hall, First Class, of Liner LEVIATHAN—the Ship is a Tribute to American Shipyard Skill

Navy Yard Competition Is Keen

NAVY yards are essential adjuncts to the defense of the country, and as such must be maintained in efficient preparedness in time of peace. This is a recognized common sense public policy. Adequate drydocks, shops fully equipped with modern machinery and a trained personnel is necessary. The repair needs of the navy are great even in times of peace and work of this nature keeps these establishments in training so that in times of more urgent need they can be readily expanded to meet the demands. As far as the trained personnel is concerned, it is entirely within the control of the navy in its commissioned officers, with the exception of a number of foremen and leading mechanics who serve as key men and through long experience have gained an intimate, practical knowledge of shipbuilding and repairs of all kinds. The great army of skilled men needed to carry on the work in an emergency can be recruited from the skilled men in private shipyards and repair yards; or by taking men engaged in other work who formerly had training and experience in this line.

Private Yards Offer Real Service

No private owner would consider for a moment having a government navy yard do repair work on his vessels. Private repair yards have been established to meet fully the needs of merchant ship repair work. The war with its attendant activity in shipbuilding and shipping greatly increased ship repair facilities and no doubt an overexpansion followed along this line as well as in many other industries. Reorganization and cutting down after the peak of war and immediate post-war activity was inevitable and has been attended to. The keenest sort of skilled competition is now assured and prices for repair work are as low as present wages and cost of materials warrant.

It is, therefore, strange that in these days with shipbuilding and ship repair needs far below the capacity of established, reliable, skilled and fully equipped shipyards and repair plants, that the very agency which is entrusted with the serious duty of the rehabilitation of the nation's merchant marine should invite bids from and award a contract to a navy yard for the reconditioning of one of these government ships. A navy yard maintained in personnel, equipment and plant by appropriations of government money might readily enough submit, as one yard recently did on the reconditioning of the shipping board liner AMERICA, a bid of $1,181,536, only $79,150 lower than the next lowest bid.

When a Bid Is Only an Estimate

Aside from the question of overhead which it may be considered must go on anyway the work may cost the government more in the end as a deficit in the appropriation allotted for the work would naturally have to be made up out of the navy yard's own funds which is just the same as taking money out of one government pocket so that another government pocket may have a fuller appearance. Not only is the uncertainty of the actual cost a serious matter, but no

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recourse is open for collecting damages for losses caused by delay in completion. The completion date for this ship was of the utmost importance, as she is scheduled and booked for service on a fixed date. One branch of the government can not very well sue another branch of the government for breach of contract. No vital responsibility rests its heavy hand on the repair people in such instances. If the ship is completed on time well and good; if not, what are you going to do about it?

Overhead is not the only charge which a navy yard can conveniently forget. Insurance is not reckoned in government estimates. Taxes, of course, are not charged against a federal estimate. The assertion also was made by one private yard that the draftsmen, always a heavy cost factor in a repair job, are paid by a separate navy appropriation, but this statement was denied by Admiral Plunkett, head of the Brooklyn navy yard. The managing personnel, of course, are navy officers whose pay is not chargeable to a specific task. And the expense of a trial trip is not included in navy yard estimates.

One big yard, which lost a repair contract through a slightly lower estimate by a navy yard, has decided not to bid again on federal work, since the mere cost of submitting a bid is heavy. The award of the PRESIDENT BUCHANAN to the Newport News yard was the occasion for a vigorous complaint from Brooklyn, led rather weirdly by the chamber of commerce of that city whose membership undoubtedly live and prosper through their freedom from government competition.

Legitimate encouragement of enterprise, courage and initiative in the private shipbuilding and ship repair plants is essential for the growth of the merchant marine. Why take away all encouragement by pitting the navy yards against full, free and fair competition of a number of good repair yards?

Use Old River Boat as Power House

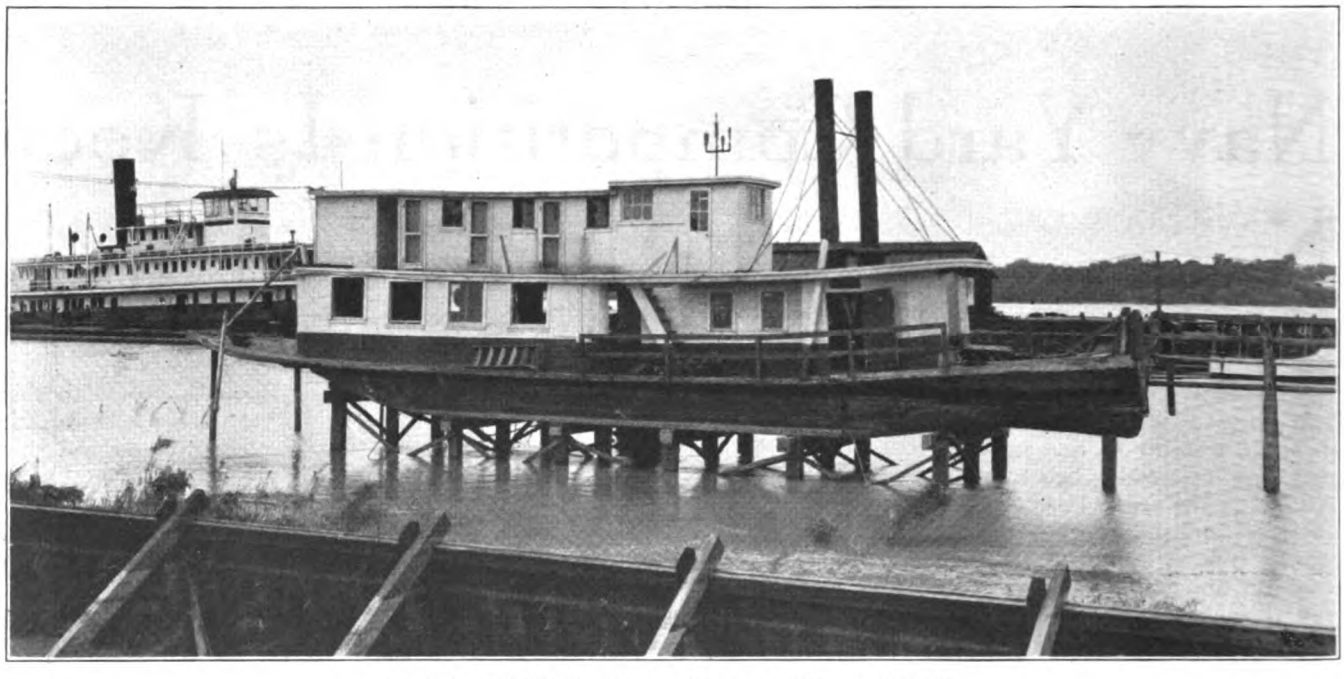
EVERY time the Mississippi river floods its banks near New Orleans, the old river steamboat A. PADDOCK, is tempted to get back into river service and vie with the craft of a younger generation. But, true to the new and unusual service to which she now is relegated, the old boat, as an official of the Standard Oil Co., her owner, aptly expressed it, "sits and smokes" and dreams of the days when once she was young.

More than 30 years old, the river boat now is a power house for the bunkerage station of the Standard Oil Co. Minus her paddle wheel but otherwise intact, the "ANDY" of bygone days now is propped up on stilts, several feet in the air and is high and dry when the Mississippi is within its banks. Occasionally the waters creep up around the props under the boat, but she keeps on, resigned to her new task.

In the old days the A. PADDOCK, was a towing steamer plying the waters of the canals and bayous of Louisiana and the Mississippi, drawing small barges and oyster boats. Soon after the close of the nineteenth century the Louisiana Petroleum Co., bought her to transport fuel oil from Donaldsonville, La., to sugar plantations along Bayou Lafourche and Bayou Terrebonne.

Later the Standard Oil Co. acquired the vessel and used her in the same service for 18 or 19 years. Old age finally made the boat unfit for the work in which she was engaged and she was retired. About that time a power plant was required for the bunkerage station and it was decided to raise the boat, jack her up permanently and put her to work as a power house.

That was done and she settled down to her new routine.



OLD RIVER BOAT NOW SERVES AS POWER HOUSE

CAPT. V. F. SPARKS has come out from Plymouth, England, to take command of the cable steamer RESTORER stationed at Victoria, B. C. He has succeeded CAPT. BASIL COOMBE, who was taken ill while the vessel was doing cable work in the vicinity of Honolulu.

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Sales of Shipping Board Vessels

LAKE ORANGO, steel cargo, 3015 deadweight tons, 1991 gross tons, to John J. O'Hagan, Buffalo.

BASCOBEL, steel ocean-type oil-burner tug, 420 gross tons, to the Gulf Coast Transportation Co., New Orleans.

HADNOT, steel tanker, 9100 deadweight tons, 6413 gross tons, to the Steamer Freeport Corp., New York.

SAPULPA, steel tanker, 9758 deadweight tons, 7311 gross tons, to the Cape Steamship Co., Philadelphia.

QUABBIN, steel tanker, 9863 deadweight tons, 7017 gross tons, to the Cape Steamship Co., Philadelphia.

HOUMA, steel tanker, 10,387 deadweight tons, 7069 gross tons, to the Cape Steamship Co., Philadelphia.

WEST NIVARIA, 8509 deadweight tons, assigned to the General Steamship Corp., San Francisco, for its Pacific coast-west coast South America general cargo service.

IMLAY, steel tanker, 9971 deadweight tons, 7005 gross tons, to the Malston Co., Inc., New York.

MEVANIA, steel tanker, 9826 deadweight tons, 7311 gross tons, to the Malston Co., Inc., New York.

CITY OF RENO, steel tanker, 9909 deadweight tons, 7004 gross tons, to the General Petroleum Corp., New York.

SILVERADO, steel cargo, 3280 deadweight tons, 2298 gross tons, to the McCormick Steamship Line, San Francisco.

CADARETTA, steel cargo, 3694 deadweight tons, 2648 gross tons, to Charles Wellington Cook, San Francisco.

CADDOPEAK, steel cargo, 3694 deadweight tons, 2865 gross tons, to Charles Wellington Cook, San Francisco.

DOYLESTOWN, steel cargo, 3702 deadweight tons, 2632 gross tons, to Charles Wellington Cook, San Francisco.

GLYMONT, steel cargo, 3701 deadweight tons, 2722 gross tons, to Charles Wellington Cook, San Francisco.

JACOX, steel cargo, 3696 deadweight tons, 2648 gross tons, to Charles Wellington Cook, San Francisco.

HANLEY, steel cargo, 11,724 deadweight tons, 7583 gross tons, to the Weyerhaeuser Timber Co., Tacoma, Wash.

POMONA, steel cargo, 11724 deadweight tons, 7583 gross tons, to the Weyerhaeuser Timber Co., Tacoma, Wash.

LAKE FERNWOOD, lake-type cargo, 2875 deadweight tons, 2013 gross tons, to the Richmond-New York Steamship Co., Richmond, Va.

LAKE FILBERT, lake-type cargo, 4040 deadweight tons, 2451 gross tons, to the Alaska Steamship Co., New York.

Intercoastal Route Attracts New Line

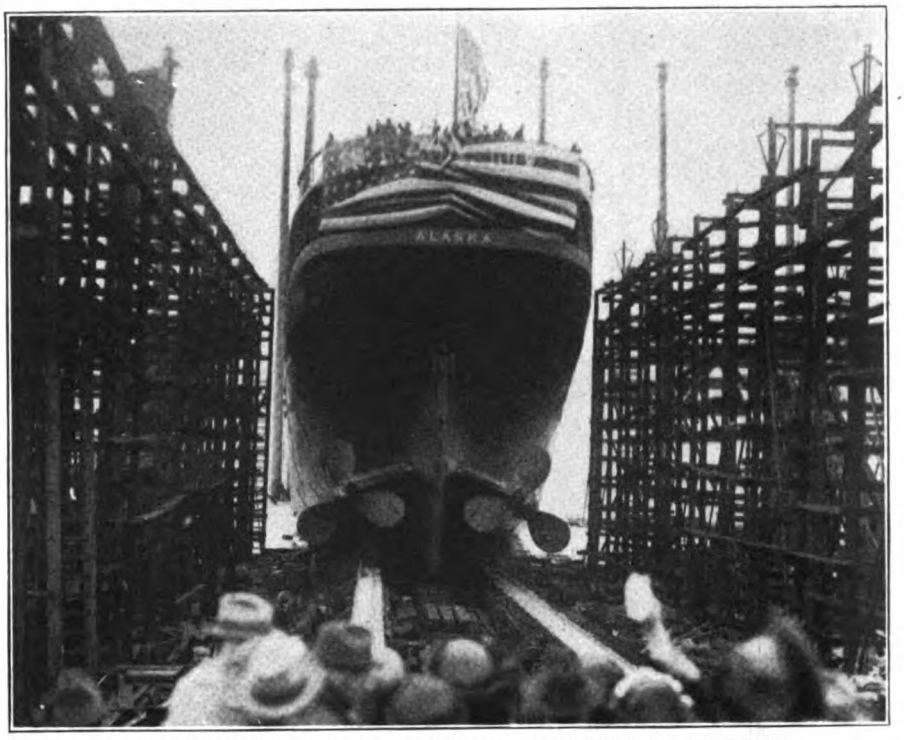
Entry of the Transmarine Corp. into the intercoastal trade and purchase by the Weyerhaeuser interests of the 10,000-ton steel steamers, HANLEY and POMONA, from the shipping board indicate increased competition on the route between American ports on the Pacific and Atlantic.

Until recently, 15 regular lines were operating on the intercoastal route and the advent of the Transmarine company adds another. Assertions that this berth is overtonnaged do not seem to keep new companies away. Under existing conditions, American shipowners recognize that the intercoastal trade is the most attractive one open to large American ships. The increase of freight on this trade route in the last two years has been phenomenal and with the inauguration of conference rates the situation is expected to be stabilized.

Sale of the POMONA and HANLEY to the Weyerhaeuser corporation does not mean a new coast to coast line. The Weyerhaeuser are closely allied with Crowell & Thurlow and it is understood that the two additional steamers will be operated in the latter's service. For three years, the HANLEY and POMONA have been running between Seattle and Oriental ports.

W. D. Benson, recently secretary of the Pacific westbound conference, has been appointed north Pacific agent for the Transmarine Corp.

Announcement is made that the Garland Steamship line, operating an intercoastal service, has appointed the General Steamship Corp., its agent at Portland and Puget sound ports.



LAUNCHING ALASKAN PASSENGER CARRIER AT TACOMA

When the steel passenger and freight steamship ALASKA was launched from the ways of the Todd Dry Dock & Construction Corp., Tacoma, recently, the event was unique in two respects. The hull was sent into the water bow first, a distinct innovation on the Pacific coast; also she is the first steel passenger carrying craft for service in Alaska built on the west coast.

The ALASKA is named aftter a former member of the Alaska Steamship Co.'s fleet lost on the California coast about three years ago. The new liner is luxurious in every appointment and will be the finest passenger vessel plying to the north. She is also especially designed for carrying copper ore and other distinctive cargoes exported from Alaska. The new vessel went in service in June.

Prof. Dr. Hans Goldschmidt, inventor of the thermit process for welding iron and steel and for producing high grade metals and alloys and also originator of many other scientific inventions, died suddenly in Baden-Baden, Germany, on May 20, after a stroke. He was 62 years old. He was president of the Goldschmidt Thermit Co., now the Metal & Thermit Corp., from 1904 to 1916. Through his death the world loses a chemist of great knowledge and inventive genius.

A record cargo of ore for Baltimore reached the port during May on the steamer AMEERSFORT. The vessel was consigned to Robert Ramsay & Co., and brought 10,360 tons of Swedish iron ore from Narvik, Norway.

New Scout Cruiser Puts Up 36-Knot Record

Officials of the Todd Dry Dock & Construction Corp., Tacoma, Wash., have received congratulations from many sources on the recent performance of the U. S. scout cruiser MILWAUKEE. On her official trial trip, the MILWAUKEE exceeded 36 knots, equal to 41.47 miles. This splendid record was accomplished in the face of unfavorable weather conditions and without developing her maximum rating of 105,000 horsepower. The MILWAUKEE'S performance is asserted to be a new world's speed record for vessels of more than 1300 tons. The trials were held in the Straits of Fuca and navy officials were delighted with the vessel's showing.

The MILWAUKEE is the second of three vessels of this type constructed at the Tacoma plant. The first delivered, the OMAHA, recently created a sensation by breaking the Honolulu-San Francisco record by covering the distance in 75 hours and 11 minutes. The Tacoma plant is now completing the CINCINNATI. The performances of the OMAHA and MILWAUKEE have received the praise of navy officials.

The Burton Steamship Co. opened a freight service between Boston and Philadelphia with the sailing of the steamer JAVARY on May 18.

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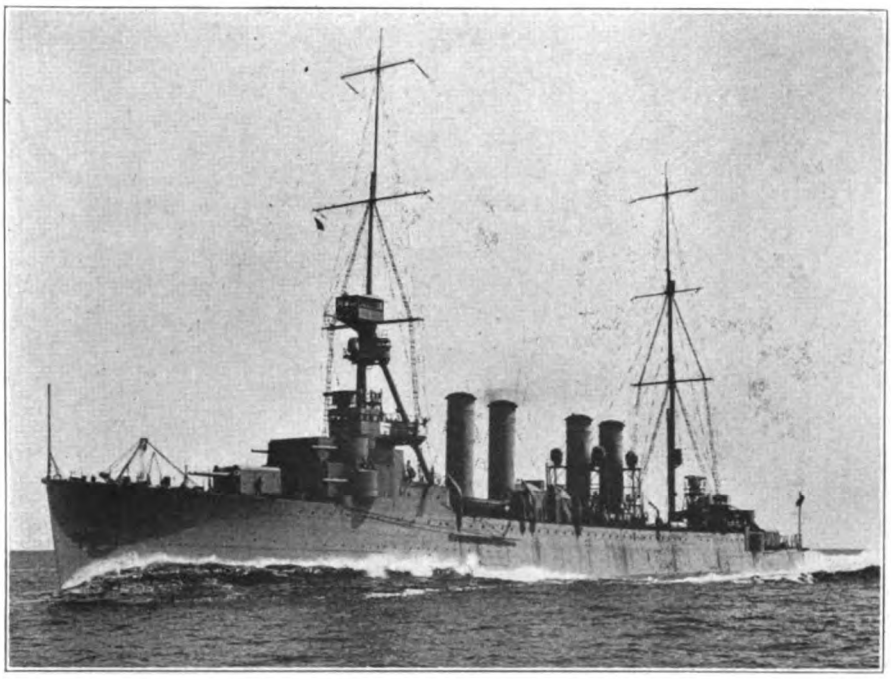

SCOUT CRUISER DETROIT ON TRIAL TRIP

Scout Cruiser Detroit Shows Speed on Trial

The U. S. scout cruiser DETROIT, which has just completed exhaustive trials off the coast of Maine, has established a record by developing the highest power ever attained by any vessel constructed in the United States. The DETROIT was built for the United States navy by the Bethlehem Shipbuilding Corp. Ltd., at its Fore River plant, Quincy, Mass.

The DETROIT is in effect a fast and powerful destroyer, having a length of 555 feet, a breadth of 55 feet and a normal load displacement of 7200 tons. She carries twelve 6-inch rapid fire guns of the latest model four 3-inch anti-aircraft guns capable of firing into the air at any angle up to 90 degrees, ten torpedo tubes fitted to fire the latest model 21-inch long range torpedoes, and more than two hundred mines which can be launched over her stern and laid in a few minutes while running at full speed.

The vessel is fitted to carry airplanes which can be launched from revolving catapults while running with, against or across the wind; also with high power radio apparatus, wireless telephones, submarine signalling apparatus, electric steering gear, laundry, workshop, hospital, etc; in fact, she is in all respects the last word is design, construction, equipment and armament that lessons of the late world war have shown to be essential for carrying out duty to which she would be assigned.

Power for lighting the vessel and for operating the searchlights, wireless and various other electric-driven auxiliaries is generated by four 100-kilowatt turbo-generator sets.

The propelling machinery of the DETROIT, designed and constructed throughout by the Bethlehem corporation, developed 100,000 shaft horsepower on trials, which is sufficient to drive the vessel through the seas at a speed of 35 knots, or nearly 41 land miles per hour. This speed would take the vessel from New York to Liverpool in 80 hours as compared with about 120 hours required for the fastest passenger liner now afloat.

Describing briefly the main propelling machinery, the vessel is fitted with 12 oil-fired water tube express type boilers, three being located in each of the four watertight compartments, and operated under forced draft. There are two watertight engine room compartments amidships in which are located the 12 powerful Curtis-type marine steam turbines. These turbines operate at a speed of 2500 revolutions per minute which is reduced through reduction gears on each of the four propeller shafts, to 400 revolutions per minute. Excellent economy is obtained in connection with the oil fuel.

Some idea of the enormous power and capacity of the propulsion machinery installed on the DETROIT may be obtained from the following figures:

At full speed, the shaft horsepower developed is approximately three times as much as fitted to the recent battleships. Oil fuel is consumed at full speed at the rate of 100,000 pounds per hour, which requires 624,000 cubic feet of air per minute to effect combustion.

The 12 express type boilers contain 65 miles of steel tubes, in which steam is generated at the rate of 1,500,000 pounds per hour at a pressure of 265 pounds per square inch.

The main turbines are fitted with approximately 32,000 blades, some of which rotate at a speed of eight miles per minute.

Four main condensers, located in the engine rooms, require about 70,000,000 pounds of sea water per hour to condense the 1,200,000 pounds of exhaust steam from the main turbines.

Several Pacific Vessels Launched in May

Sustained activity is apparent at the Seattle plant of the Todd Dry Docks, Inc., this spring having been the most active in recent years. Work at this yard has been temporarily interrupted by the strike of metal trades workers but, notwithstanding, several large jobs have been under way. This plant recently delivered the steel steamer SAGADAHOC on which about $200,000 was spent in rehabilitation after the intercoastal carrier had been ashore, in Puget sound waters.

The diesel-electric dredge TEXAS, built of wood at the Portland, Oreg., shipyards was launched for the Long-Bell Lumber Co. on May 14. This dredge is said to be the only one of the kind in existence. It is equipped with 525 horsepower and will operate a 15-inch pipe line.

At the Vancouver, B. C., shipyards, the motor tug WERKSPOOR, 85 feet in length, has been launched.

The first halibut fishing vessel built in Puget sound waters in several years was launched at Seattle May 18. This schooner is the RADIO, built of wood and powered with a 100-horsepower gas engine.

The Supple & Martin Shipbuilding Co., Portland, Oreg., has been awarded the contract for constructing a $55,000 wood stern wheel river steamer for the Oregon-Washington railroad. This vessel will be used in general freighting on the upper Columbia river.

The Wood ferryboat WHIDBY was launched at the Martinolich yards, near Tacoma, Wash., on May 6. This vessel will be used in Puget sound waters and has capacity for 400 passengers and 35 automobiles. The WHIDBY is 122 feet in length with beam of 33 feet. Triple expansion steam engines will supply the power.

Part of the former Standifer shipbuilding plant at Vancouver, Wash., has been leased to a firm manufacturing terra cotta and other building materials.

The Halifax & Newfoundland Steamship Co., shipping and general freight, Boston, has been incorporated for $75,000 by William D. Vanderbilt, Alfred H. Post and Sidney Hoey, Boston; Eugene P. Carver, Jr., Brookline, Mass., and Frank H. Chipman, Cambridge, Mass.

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Big Canadian Diesel Engined Tug

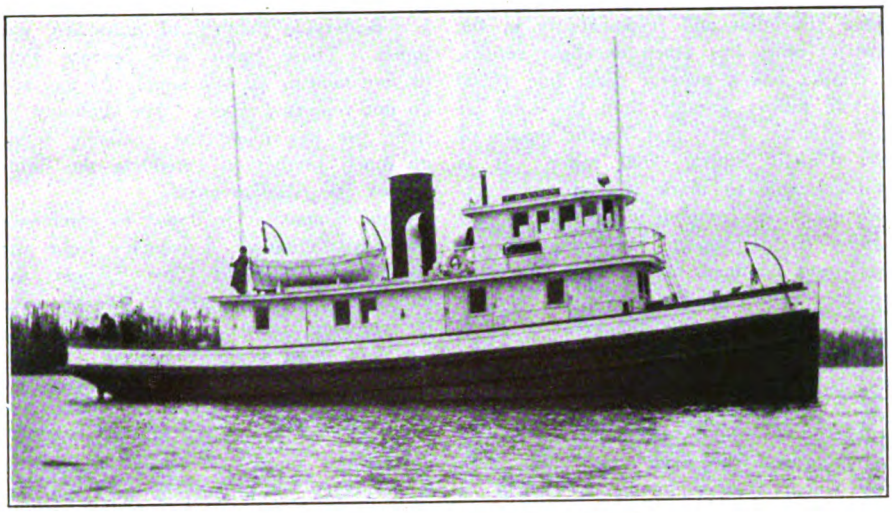
The Abitibi Power & Paper Co. Ltd., Montreal, who operate a large paper mill at Iroquois Falls, Ont., recently commissioned Ralph E. Winslow, Atlantic, Mass., to design a new power towboat, the F. H. ANSON, to replace three steam towboats. This new tug is now towing booms of logs for pulpwood from Couchiching Falls to Twin Falls on the Abitibi river, Canada. These booms, containing about 3500 cords of wood, are towed about 22 miles, the tug making one round trip each 24 hours. Two crews were necessary, and accommodation for these men, as well as for extra raft-men and company officials, are provided, although such a tug could be operated by four men. As there is no limit on draft this has been made sufficient to immerse an efficient propeller. The dimensions of this tug, which has a Winton 4-cycle diesel engine, are as follows:

Length over all, 83 feet; length of water line, 77 feet four inches; breadth, 20 feet; draft, nine feet six inches; power, 300-shaft horsepower.

As shown in the accompanying photograph, the design follows the usual towboat type and such a craft as this is suitable for all kinds of work about harbors, for bay or coastwise towing.

The machinery equipment of this tug is quite complete, consisting of a direct reversible 6-cylinder 12-15-16 by 18-inch Winton diesel engine, developing 300 brake horespower at 210 revolutions per minute; one Winton auxiliary air-compressor with 12-horsepower motor; fuel oil transfer and service pump with 1-horsepower motor; Exeter fire. bilge and general service pump with 5-horsepower motor; a 10-kilowatt Crocker Wheeler electric-generator driven by 15-horsepower Frisbie engine; also a 25-cell, 32-volt Edison storage battery, slate switchboard and 14-inch low-voltage searchlight. The usual starting-air bottle, lubricating-oil tanks, workbench, etc., are installed. The exhaust is in the stack; a large hatch is fitted over the engine as well as a 1-ton trolley.

The keel frames, stem, stern, frame, etc., are yellow pine, ceiling and decks are Oregon pine. There are three watertight bulkheads. The fuel tanks hold 4200 gallons. Accommodations are provided for 12 men, six in forecastle, two in engineers' stateroom, two in captain's room, two in company officials' room, in addition to the usual mess room, galley, store rooms.



POWERFUL DIESEL-ENGINED TUG

This tug is now in operation in the wilderness of northern Ontario towing great booms of paper-pulp logs on the Abitibi river, these booms containing from 2500 to 3500 cords. The engine swings a four-blade bronze propeller of 6-foot 6-inch diameter and 4-foot 6-inch pitch at from 40 to 260 revolutions per minute when light, and from 40 to 208 revolutions per minute when towing. When running light, the speed is 13 miles per hour, while towing the huge rafts of logs, the speed is 1¼ miles an hour.

These rafts are about one-half mile long and about 800 feet wide. Towing such huge rafts is only possible because of the power of the diesel engine, it is said, as in the first six days of operation 14,500 cords of pulp wood were delivered to the mill by the F. H. ANSON, which the company officials state was more than their three steamers delivered in ten days of last year. In fact, this tug handles rafts containing more logs than can be used, so that the original plan of operating 24 hours per day with two shifts of crew has been abandoned.

Her fuel consumption at various revolutions and horsepower is as follows: at 260 revolutions per minute corresponding to 375-brake-horsepower, 24 gallons per hour; at 196 revolutions per minute corresponding to 300-brake-horsepower, 22 gallons, and when towing at 176 revolutions per minute delivering 287-brake-horsepower, the consumption is 18.5 gallons.

C. E. FLYE, assistant general freight agent of the Pacific Steamship Co., has been appointed assistant freight traffic manager. Mr. Flye's headquarters will remain at Seattle. The position now filled by Mr. Flye is a new one created to relieve R. J. Ringwood, freight traffic manager.

Lighthouse Work in Remote Alaska

The most remote lighthouse of this country is that at Cape Sarichef, marking the Unimak pass from the Pacific ocean into Bering sea. From the Alaska lighthouse headquarters at Ketchikan, the lighthouse tender must make a roundtrip voyage of 2700 miles to supply this station, and it can make this trip only once a year. The mail boat leaves the mail when landing is possible, but a few years ago the light keepers went 10 months—from August of one year to June of the next—without receiving mail.

This is the only lighthouse on the entire shore line of Bering sea. The keepers at this station remain on duty for three years, and then in turn are allowed a year's leave of absence. To relieve the isolation, radio telephones were recently installed at this station and at Scotch Cap lighthouse, 20 miles to the southward.

In the Russian days, only one small light for the benefit of navigation was maintained in Alaska, on the Baranof castle in Sitka. From the purchase in 1867 to 1910 the lighthouse work in Alaska was carried on by dispatching a supply vessel from Oregon for the summer. In 1910 Alaska was made a separate lighthouse district, under a responsible officer with headquarters at Ketchikan, where there is now a district office and supply station. There were in that year 37 lights in Alaska. This number has now been increased to 210, with 374 other aids to navigation, including buoys, fog signals, and beacons.

The present superintendent of the sixteenth lighthouse district is Capt. W. C. Dibrell, a civil engineer as well as navigator and hydrographer, who is just completing 10 years' duty at this remote post and 23 years in all in technical government work. The policy of placing

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wide discretion and responsibility in the district office has given excellent results.

Alaska has a general coast line (6600 statute miles) greater than the total of the Atlantic, Gulf, and Pacific coasts of the United States, 4900 miles. It is impracticable to mark this sparsely settled coast as completely as that of the United States proper. The work thus far has been confined to the more traveled steamer routes as far westward as Unimak pass. Beyond this, the great stretches of the shores of Bering sea and the Arctic are at present unmarked except for a few small lights in Norton sound.

The thousand-mile channel from Seattle to Skagway, the most remarkable protected salt-water route in the world, is continuously lighted by the United States and Canada, and has also a number of powerful fog signals.

Steady progress is made in new lighthouse works in Alaska. In recent years there have been constructed an important lighthouse and fog signal at Cape St. Elias, the large supply steamer CEDAR and the depot at Ketchikan, as well as a considerable number of automatic gas lights. These lights will operate four or five months on one supply of gas and do not require keepers. The economy of their use has made the available funds go much further in extending the lighting of the Alaskan coasts.

This summer it is hoped to commence the construction of a primary light and fog-signal station at Cape Spencer, the entrance into southeastern Alaska used by shipping from the westward. This has long been urgently needed. A ship captain recently described its necessity thus:

"With a ship arriving at Cape Spencer during the foggy or snowy weather, it is necessary to lie outside until the following day at daylight, and of which during the winter we have only six or seven hours at most. With no fog signal there, as at present, we have to stand a safe distance off at sea, and if it is still foggy or snowy next day it is almost impossible to find the entrance, which may mean another night at sea."

A number of wrecks have occurred in this vicinity, and it has been a place of great anxiety to mariners. Oftentimes it is necessary in Alaska to place lights on very exposed rocks, over which the seas break in storms, and in some instances great difficulty has been encountered because of the severe storm and wave action. For example, in the last 10 years three successive structures of concrete or steel have been built on Dewey rocks near Dixon entrance, and all have been carried away.

The conditions of navigation due to fog and storm and long darkness for half of the year, to the precipitous and rocky coast line for all the southern portions, the large tide with strong currents, the great depths with infrequent convenient anchorages, all warrant as much aid being given to mariners in the way of more and improved seamarks, as the ship traffic and the resources of the country justify. Alaska is peculiarly dependent on its waterways and water traffic. There is constant demand for more lights and buoys, and additional fog signals are also much needed.

Lake Ports Must Plan for Ocean Trade

BY ROY S. MAC ELWEE AND ALFRED H. RITTER

IN ANTICIPATION of the adoption of the project for improving the St. Lawrence river to a depth suitable for ocean vessels, some ports of the Great Lakes are taking preliminary steps to fit themselves for coastwise and overseas business. Efforts in this direction are not premature, because extensive study and investigation are necessary to develop a safe foundation for the terminal layout and to solve the many problems involved in the establishment of a successful port.

Port Plans Usually Haphazard

The United States has never had a properly devised transportation system co-ordinating the rail and ocean carriers through the medium of port terminals located and planned to meet the requirements of commerce and shipping. Thus it has transpired that American ports, like Topsy, just grew. This growth has been dictated by the business foresight or lack of foresight of the railroad lines linking up the ports with the interior. At some ports, terminals of several different railroad systems are so located as to constitute separate and distinct developments. The struggle of each railroad in these cases has been to control as much of the traffic as possible, and to accomplish this purpose charges of various kinds have been imposed to discourage the routing of traffic over terminals other than that of the railroad performing the line haul. The development of business at such ports is greatly embarrassed.

At many ports, the railroads have failed to provide the character of facilities suitable for meeting the cargo requirements of vessels and it has, therefore, been impracticable to establish regular liner service at such ports, notwithstanding their natural advantages. Manufactured goods originating in the South Atlantic states are frequently sent by rail to New York and shipped abroad, because there has been no adequate development of general cargo business at South Atlantic ports. Had the transportation systems been planned with a view to the best interests of the nation instead of the interests of the individual carriers, facilities would have been provided and rates fixed so as to encourage the distribution of traffic through all ports with due regard to the needs of commerce and vessels as well as the needs of railroads.

Cargo Advantages of Lake Ports

The economic factors affecting the movements of ships and distribution of cargoes are intricate. Ideal conditions for successful operation of vessels are found on routes where each terminal port provides both deadweight and top cargo of suitable kind and character to make up full loads in both directions. In practice such conditions rarely exist. The ports of the Great Lakes are especially fortunate in having both bulk and general cargo, thus affording unexcelled opportunities for correct loading and quick turnaround of the ship. Moreover, it is peculiarly fortunate that grain and flour are available at the final ports of the ocean routes, as these commodities as a rule are loaded into the vessel first. Vessels will be able to take on grain and flour at Duluth, Superior, Port Arthur, Milwaukee, Chicago and Toledo with such other freight as may be available and finish loading if necessary at some port on Lake Erie without deviation from their routes.

The importance of grain for deadweight cargo is well known, but grain has a further function. Few ports afford sufficient high class cargo such as manufactured goods to make a full shipload without accumulating cargo or holding the vessel for an unreasonable period. The availability of grain at a port makes it practicable for the vessel to take on a sufficient amount of heavy cargo to make up full loads in conjunction with such amount of general cargo as it may be able to secure. Ports which do not have some

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heavy commodity of this nature find it difficult and in most cases impracticable to maintain direct shipping service to foreign ports.

In appraising the future opportunities for ocean trade, the important ports of the Great Lakes need have no apprehension that ocean vessels will not seek them. Vessels will go to any accessible port where there is cargo of proper kind in sufficient quantity to make up full loads, particularly if the port can absorb a reasonable amount of return cargo. It is significant that a substantial part of the imports of the United States are destined to the manufacturing industries of the Great Lakes, and include such articles as burlaps and other fibers, hides, sugar, rubber, woodpulp, china, clay, and many other articles normally consumed throughout the northwest which now make their entrance into the United States through North Atlantic, South Atlantic and Gulf ports.

Some of the successful ports have practically no imports from the continents to which their exports are destined. The cargo advantages of the ports of the Great Lakes afford a firm foundation for the successful development of ocean trade. For deadweight there is an abundance of grain, flour, iron and steel, salt, cement, ores, and many other commodities in lesser quantities. For top cargo, there are automobiles, agricultural implements and vehicles, machinery of many kinds, textiles, rubber goods, and the countless miscellaneous manufactures originating in great volume in the tributary territory. To obtain and retain the business, however, the ports of the Great Lakes must be so developed and equipped as to meet the needs of the vessels which may be expected to seek them, and the needs of the particular kinds of cargo which may be advantageously routed through the port.

Grain Stabilizes Liner Service

In normal times, grain is carried from Montreal, Boston, New York and New Orleans as part cargo rather than in full cargoes. This is due to the fact that these ports have regular liners on which low berth rates are made for this class of cargo. Recently, however, the supply of vessels has exceeded the demand, and many tramps have carried grain from ports which they normally do not visit. In order for lake ports to become established in overseas trade, however, they must offer regular liner service with sailings at fixed intervals. They can not build up a general shipping business on tramp service alone.

Since grain constitutes the most important commodity which will move from the Great Lakes to foreign markets, the ports of the upper lakes must be prepared to handle grain in the manner required to meet the new shipping conditions. At the present time, the elevators at these ports are placed without regard to other traffic. On the Great Lakes, grain is now carried almost exclusively in full cargoes. The bulk and package traffic are separate and distinct and the terminals have, therefore, not been planned with a view to handling both classes of cargo at the same pier. While much grain will no doubt be shipped from upper lake ports in full cargoes, preparation must be made for shipping in part cargoes as well, and to avoid an extra movement of the vessel within the port, grain galleries should reach the piers to be occupied by vessels in overseas trade. In this particular, Montreal is a model worthy of imitation.

Public Control of Port

Where practicable, the development of the port should be undertaken by the state or municipality. It is not only possible, but desirable to harmonize the port development with a comprehensive plan for city improvement and beautification. Neither of these important problems should be considered without due regard to the other. The errors committed at Atlantic ports in permitting the usurpation of strategic waterfront property by railroad interests should not be repeated on the Great Lakes. All terminals capable of serving lake or ocean business should be interconnected under a plan which will place all of these terminals and all of the rail carriers on an equal basis, so that traffic may flow through the port without hindrance.

A careful study should be made by each port to determine the probable cargo which will be available for export and coastwise shipment, and the imports and inbound coastwise traffic which can be advantageously distributed through the port. This information is essential before a suitable terminal layout can be devised; moreover, it will afford a valuable index to the cargo situation and the ability of the port to establish a well balanced traffic.

The layout of the port is an important factor in determining the position which the port will occupy as a gateway for commerce. Some serious errors in port planning have been due to ignorance of transportation requirements. Some of the terminals constructed within the last few years have totally disregarded the fundamental principle that economy and facility in the interchange of traffic are the objects to be achieved by any successful terminal development. The layout of the port and the dimensions and capacity of the terminal units can not be accurately determined until a study has been made to ascertain the amount and kind of traffic and the size and character of vessels which will seek the port. There is no more excuse for planning a port without this essential information than there is in making a suit for a man without taking his measure. A misfit terminal is a perpetual barrier to the development of traffic, but a terminal which is properly planned to meet the needs of commerce will permit the lowest possible charges against the ship and cargo and still earn sufficient to relieve the taxpayers of any burden.

At every important port, the through traffic is very much greater than the local traffic, and if the citizens of the port itself are compelled to support an uneconomical terminal development, showing costs per ton in excess of charges that can be assessed without driving business from the port, the burdens of these taxpayers will increase instead of diminish with the development of the through traffic. This is the problem that now confronts some ports.

Problems are Individual

Each port presents a separate economic problem which must receive expert study before any attempt is made to plan the physical facilities. Its especial function as a unit in the national transportation scheme must be accurately comprehended. Until this has been accomplished, the planning of the port and its facilities can have no sound basis. A terminal which is ideal for one port may be wholly unsuitable for another. If the port is one where the traffic must be developed, the terminal should be so designed as to permit the installation of machinery when justified, and the initial equipment should be restricted to the less expensive types of handling appliances, which, under the conditions cited, will show lower costs per ton of freight moved.

If the port be properly planned with relation to the freight which will pass through it and the carriers which will seek it, the interchange of traffic will be accomplished at a cost per ton which will constitute true economy. If the land and water routes are not properly co-ordinated, and the facilities are not correctly designed and located to meet the precise demands of traffic, the efforts of the port to develop business will be hampered.

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Big Transatlantic Liner Is Motor Driven

The Hamburg American line's new motorship MUENSTERLAND was built by Blohm & Voss, Hamburg, and is rather unusual in that her propelling machinery consists of twin high speed oil engines, on the same lines as the larger submarine diesel, equipped with reduction gearing. The general characteristics of the ship are as follows:

Length overall, feet	465
Length between perpendiculars, feet	450
Breadth, feet	58
Carrying capacity, tons	10,233
Draft, feet, inches	25 1 5-16
Gross tonnage,	6308
Net tonnage,	3829
Fuel oil capacity, tons	1400
Speed, knots,	12
Shaft horsepower	2x1650
Oil consumption tons, per day, about	15.

The two main engines are 4-stroke cycle type, and were built during the war by the Augsburg works of the firm Augsburg-Nurnberg, originally for submarine use.

The German firm of Blohm & Voss is licensed to build these engines and has already built several, of which two have been in use in its power plant for several years. The engines are said to represent both in design and construction a high degree of development of the high speed 4-stroke cycle oil engine.

Each engine has 10 cylinders, 20⅞ inches in diameter with a stroke of 20-⅞ inches. The number of revolutions which was to be 390 for submarine propulsion was reduced to 230, which gives a piston speed of 13.3 feet per second. The mean indicated presure has in a like manner been reduced from 117.8 pounds square inch to 102.2 pounds square inch. With these factors, each engine develops 1650 shaft horsepower. The cylinders are cooled by salt water, and the pistons by means of oil. The reduction gears have a ratio of 1 to 2.7 so that the propeller makes 85 r.p.m.

The question of the operation of the reduction gear between engine and propeller was examined on the test stand, using gears of the actual size. It became necessary to offset the negative turning moments which occur with oil engines, and are especially great in the neighborhood of the critical speed, in order to prevent excessive wear of the gear teeth.

This has been accomplished in the installation in question by properly proportioning the transmission shafting and the suitable distribution of revolving masses or balance weights. By means of a special apparatus, the twisting moments in the shaft before and aft of the reduction gears were measured photographically revealing the uniformity of twisting moment in the shaft on a par with that of the present installation. It is claimed that the present installation made possible a saving in weight of 330 tons and in space of 6000 cubic feet, and still the engine room is of ample proportion.

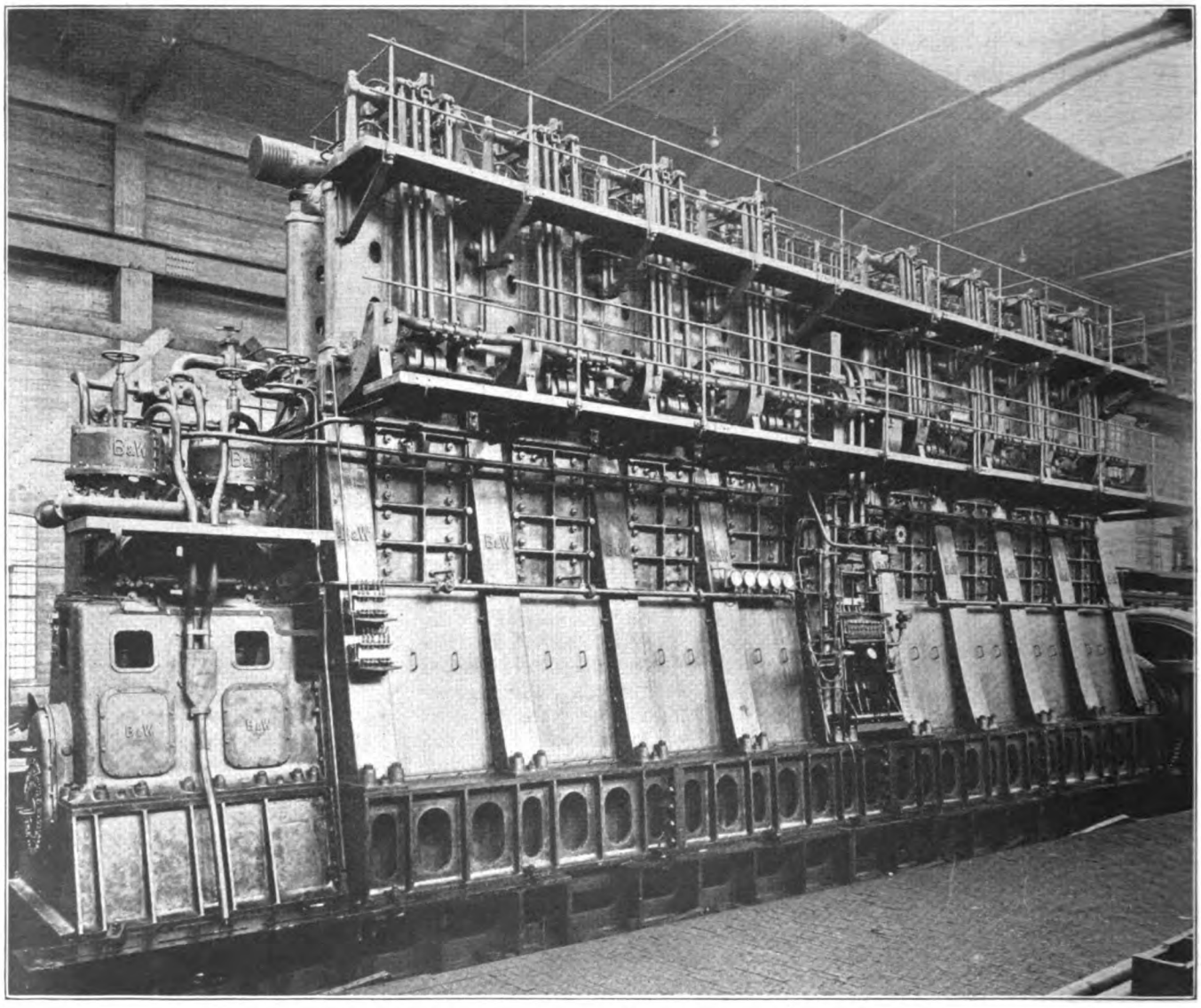

FIG. 1—ONE MAIN ENGINE UNIT FOR TWIN SCREW CARGO CARRIER OCEAN I

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Large Engine Units for Diesel Freighters

The cargo carrier OCEAN I recently completed for the Ocean Steamship Co., Ltd., Liverpool, has a twin screw diesel plant of 6000 indicated horsepower, supplied by Burmeister & Wain, Copenhagen, Denmark. Two units form the propelling plant, the main engines being built as 8-cylindered, 4-cycle, single acting forced lubricated direct reversible diesel engines with a combined continuous output at normal load at sea of 6000 indicated horsepower at 115 revolutions per minute, the bore being 740 millimeters and the stroke 1150 millimeters.

Each engine on its forward end is fitted with a multistage compressor, capable of delivering the necessary air for injection air, and a separate fuel oil pump for each cylinder is provided.

Four auxiliary engines are provided, these being of the 3-cylindered type direct-coupled to a dynamo of 100 kilowatt capacity at 220 volts and provided on the forward end with a multistage air compressor for supplying injection air. Each of the engines is capable of developing continuously 150 brake horsepower at 300 revolutions per minute.

The reason for the especially large auxiliary machinery is the large amount of current required for electric light, refrigerating plant, etc., the ship also being intended for passengers. The accompanying views, Figs. 1, 3 and 4, show the main and auxiliary engines and also the maneuvering compressor; this latter is separately driven by an electric motor, and the compressor is of the multistage type, pumping up to 25 atmospheres.

All auxiliary machinery is electrically driven, and consists of two separately driven cooling water pumps, two lubricating oil pumps, one daily supply and transfer pump and a steam driven emergency air compressor.

On the cargo carrier OCEAN II, also built for the Ocean Steamship Co., Ltd., a single screw plant of 3000 indicated horsepower was installed by the same engine builder. The main engine is built as an 8-cylindered, 4-cycle, single acting forced lubricated direct reversible diesel engine with a continuous output at normal load at sea of 3000 indicated horsepower at 85 revolutions per minute.

The engine on its forward end is fitted with a multistage compressor, capable of delivering the necessary air for injection air, and a separate fuel oil pump for each cylinder is provided.

Three auxiliary engines are provided, these being of the 3-cylindered type direct-coupled to a dynamo of 100 kilowatt capacity at 220 volts and provided on the forward end with a multistage air compressor for supplying injection air. Each of the engines is capable of developing continuously 150 brake horsepower at 300 revolutions per minute.

In this installation also, the reason for the especially large auxiliary machinery is the large amount of current

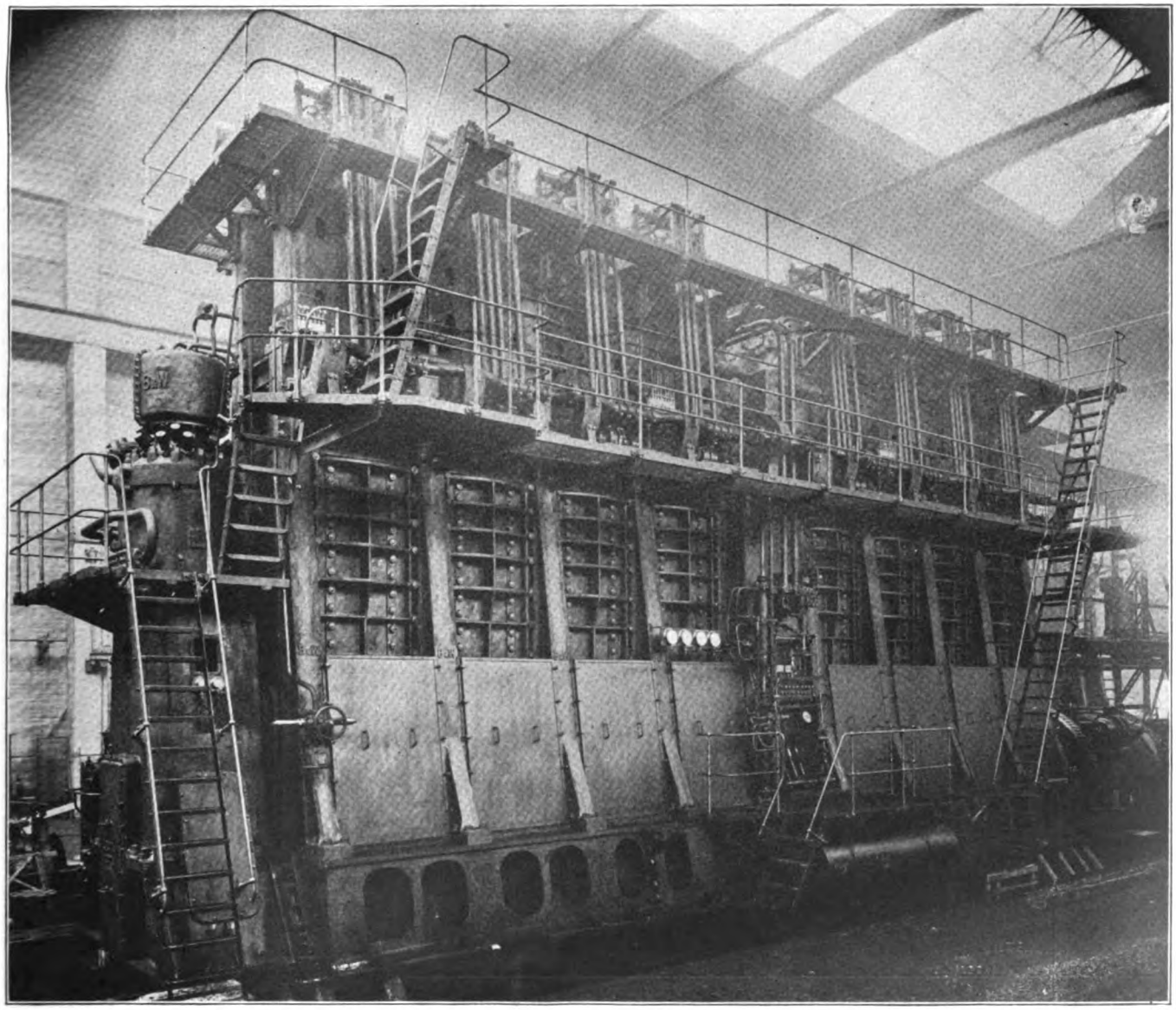

FIG. 2—MAIN ENGINE FOR SINGLE SCREW CARGO CARRIER OCEAN II

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required for electric light and refrigerating plant. The accompanying view, Fig. 2, shows the main engine.

All auxiliary machinery is electrically driven, and consists of two cooling water pumps, two lubricating oil pumps, one daily supply and transfer pump and a steam driven emergency air compressor, bilge, sanitary and fire pumps.

Crowell & Thurlow Steamship Co., which operates the C. & T. Intercoastal line from Baltimore, has announced its plan for floating a new issue of $600,000 of 8 per cent 10-year second mortgage notes. The notes are to be offered to stockholders at par.

What British Are Doing

THE twin-screw cable steamer MIRROR built by the John Brown & Co., yard Clydebank, for the Eastern Telegraph Co., London, was launched in May and will be followed shortly by the sister ship NORSEMAN. The length of the boats is 270 feet, 8 inches, the extreme width 37 feet, 2 inches, the molded depth 25 feet, and the gross tonnage 1740. They will be propelled at a speed of 12 knots by triple expansion engines of 1500 indicated horsepower, constructed by the builders. Each will have three cable tanks of a total capacity of 16,000 cubic feet equivalent to about 530 miles of cable, two sets of the latest type of cable working machinery and large sheaves at the bow for cable laying purposes.

Sir Thomas Bell, managing director of John Brown & Co., speaking at the luncheon, mentioned that in 1872 when the Eastern Telegraph Co. was founded, the total length of cables laid would have sufficed to go about one-third around the world, while in 1922 the length was sufficient to encircle the world 13 times. J. C. Dennison-Pender, M. P. said this was the first cable ship built by the company and the new vessel would take her place in a fleet of 16 vessels looking after an enormous mileage of cables.

* * *

MESSRS. SWAN HUNTER & WIGHAM RICHARDSON, who control 48 building berths, have within five months built and finished eight out of nine steamers for Canada. Within the last month, all the vessels have been dispatched. The ninth vessel is being built at Londonderry. Some pressure has been exercised to get the vessels ready in time for the opening of the St. Lawrence spring navigation. The vessels are specially designed for the navigation of the canals and locks of the Great Lakes. Each vessel is 250 feet long, 42 feet 6 inches beam and 20 feet 6 inches deep.

* * *

SPEAKING at Wallsend on May 12, Sir G. B. Hunter, chairman of the Swan Hunter company expressed his regret that orders for a floating dock for South America and one for the continent on which the firm bid had been placed with continental firms at much lower prices than those quoted by his firm. The only hope for securing future business was by the reduction of costs.

* * *

REPEATED conferences between shipowners and workpeople in regard to the introduction of a third shift system in the Bristol channel ports to facilitate the clearance of vessels in that area have taken place at the offices of the ministry of labor in London. The parties are endeavoring to arrive at a settlement and it is understood that failing an agreement, the question will revert to the court of enquiry for a decision.

* * *

THE White Star line has inaugurated a new passenger service between the Clyde and the St. Lawrence ports of Quebec and Montreal. A beginning was made with the 15,000-ton steamer MEGANTIC which sailed from Liverpool to the Clyde before starting on her Atlantic voyage. The MEGANTIC has accommodation for 1700 passengers including 250 first class, 430 second class, and over 1000 third class. The vessel

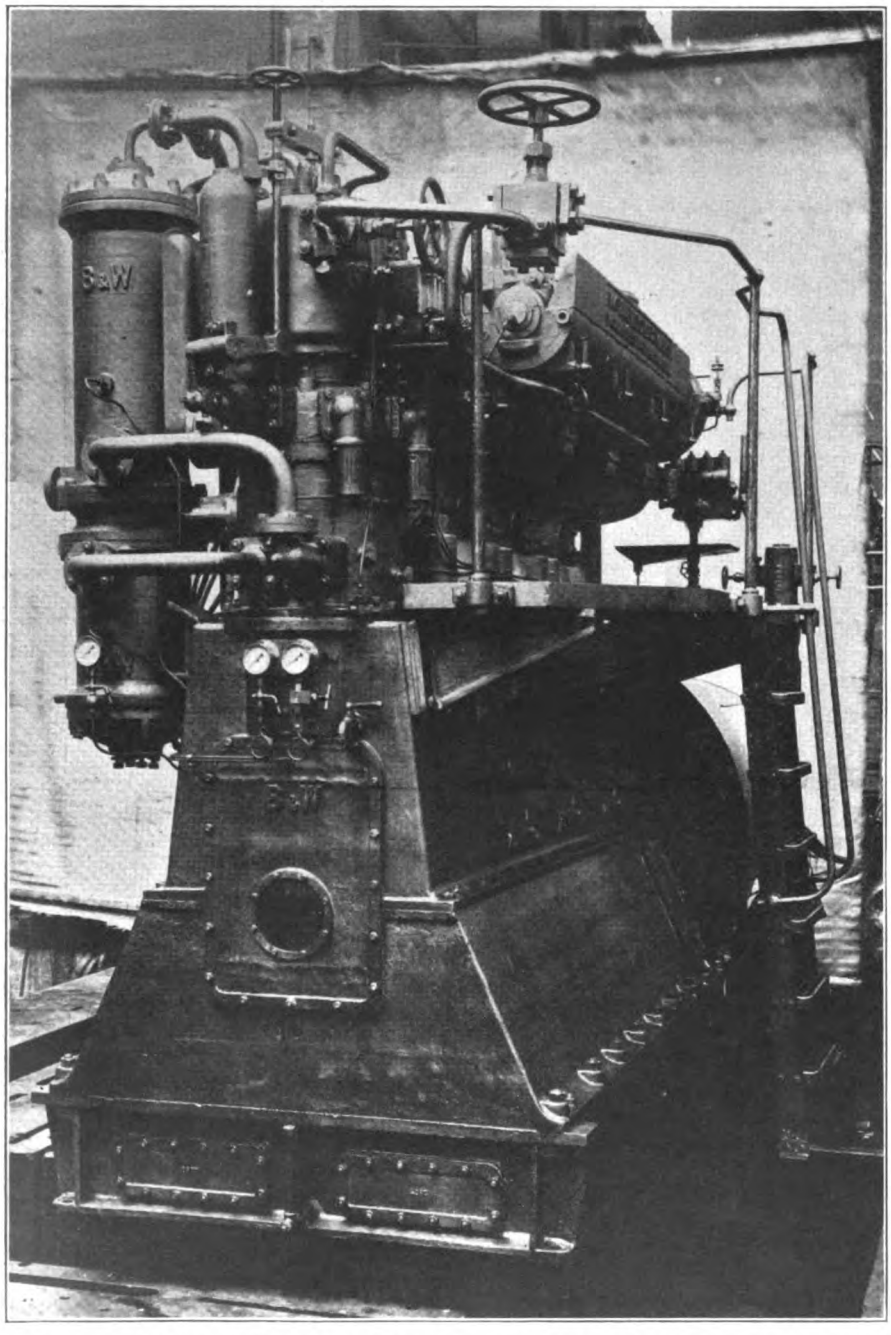

FIG. 3—AUXILIARY ENGINE OF TYPE INSTALLED ON FREIGHTERS OCEAN I AND OCEAN II

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has nine watertight bulkheads dividing the hull into ten watertight compartments, and is said to be the only liner carrying three classes of passengers between the Clyde and Canada.

* * *

FURNESS SHIPBUILDING CO. has launched from its yard on the Tees the grain carrying steamer WILLIAM H. DANIELS built to the order of the Eastern Steamship Co., Ltd., Buffalo, U. S. A., for service on the Great Lakes. The vessel is 253 feet long and has a hold capacity of over 130,000 cubic feet grain measurement. Her sea speed will be 10 knots and her mean draft loaded 14 feet. Two steel tube masts are designed to take wireless aerials, lamps and signals. The whole of the living accommodation is heated by means of steam radiators, and natural ventilation is arranged for throughout.

* * *

A LARGE and influential deputation recently waited upon the Great Western Railway Co. to urge the claims of Newport for increased dock accommodation. It was argued that Newport was specially situated in regard to traffic to the Midlands as well as to South Wales. The directors stated that they were considering the necessity for improved dock accommodation for the whole of South Wales, and that the claims of Newport would have consideration.

* * *

WALTER BAIN, a former director of the Ayr Steam Shipping Co. and of the Laird line, died on May 18 at his residence, Derclach. He came to Ayr 40 years ago to fill a responsible post with the Ayr company and eventually became a partner. On the amalgamation with the Laird line he became a director. He served in addition on a number of public companies and did considerable municipal work.

* * *

CONTRACT for enlarging the graving dock of the Smith Dock Co.'s dockyard, North Shields, to accommodate the largest oil tankers has been let to Purdie, Lumsden & Co., Newcastle. The dockyard is to be enlarged by three acres and a huge retaining wall 500 feet long and varying from 12 to 50 feet high of reinforced concrete is to be built.

With the increase in wood pulp imports through Baltimore, it is rumored that northern interests are contemplating the establishment at that port of a paper mill for manufacturing Canadian pulpwood into print paper. The Baltimore plant would serve the southern consuming district.

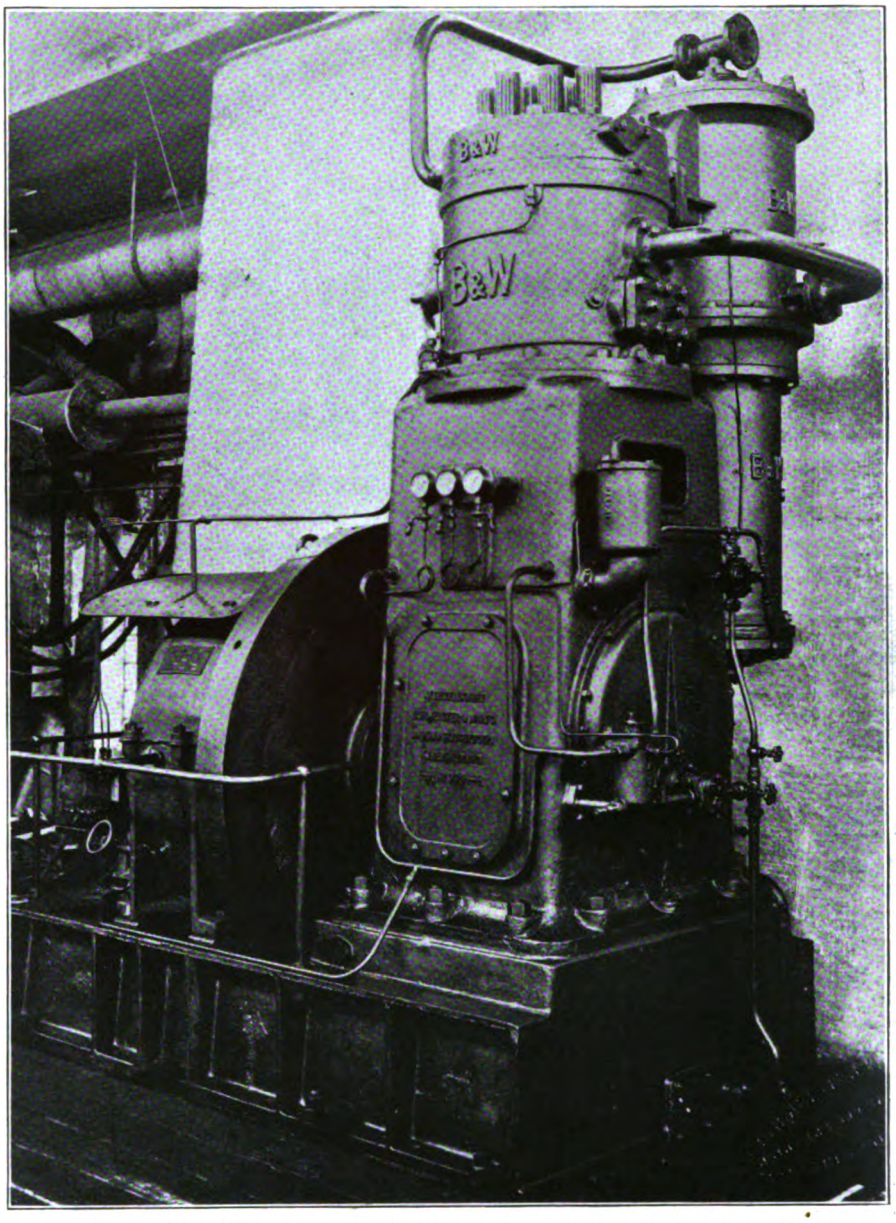

FIG 4—MANEUVERING COMPRESSOR FOR INSTALLATION ON CARRIER OCEAN II

Deliver Big Liner for Far Eastern Trade

Cammell Laird & Co. have completed at their Birkenhead shipyard the twin screw steamer SARPEDON built to the order of Alfred Holt & Co. for their passenger service to the Far East. The vessel is of the well-deck type with erections amidships. She has two steel pole masts and one funnel with a raking stem and elliptical stern and has been built to the owners' requirements and survey.

The principal dimensions are: Length overall 517 feet 6 inches by 62 feet molded breadth by 39 feet molded depth to the upper deck, with a load displacement of about 19,400 tons.

There is a cellular double bottom fore and aft and nine watertight bulkheads extend to the upper deck, subdividing the hull in accordance with the international convention regulations for the safety of life at sea. There are three continuous decks, lower, main and upper, and also poop centercastle and forecastle deck with promenade and boat deck above the centercastle deck, amidships.

Horizontal and vertical sliding watertight doors are fitted in the watertight bulkheads below the upper deck and are operated by hand as well as controlled on the Scott-Ross electrical system.

A fire resisting bulkhead is built between the upper and centercastle decks and one between the centercastle and boat decks to secure the safety of the ship against the spread of fire.

There are six cargo holds with lower and main between decks cargo spaces. No. 5 hold and No. 5 main and lower between decks are insulated for carrying refrigerated cargoes.

Insulated storerooms for ships use

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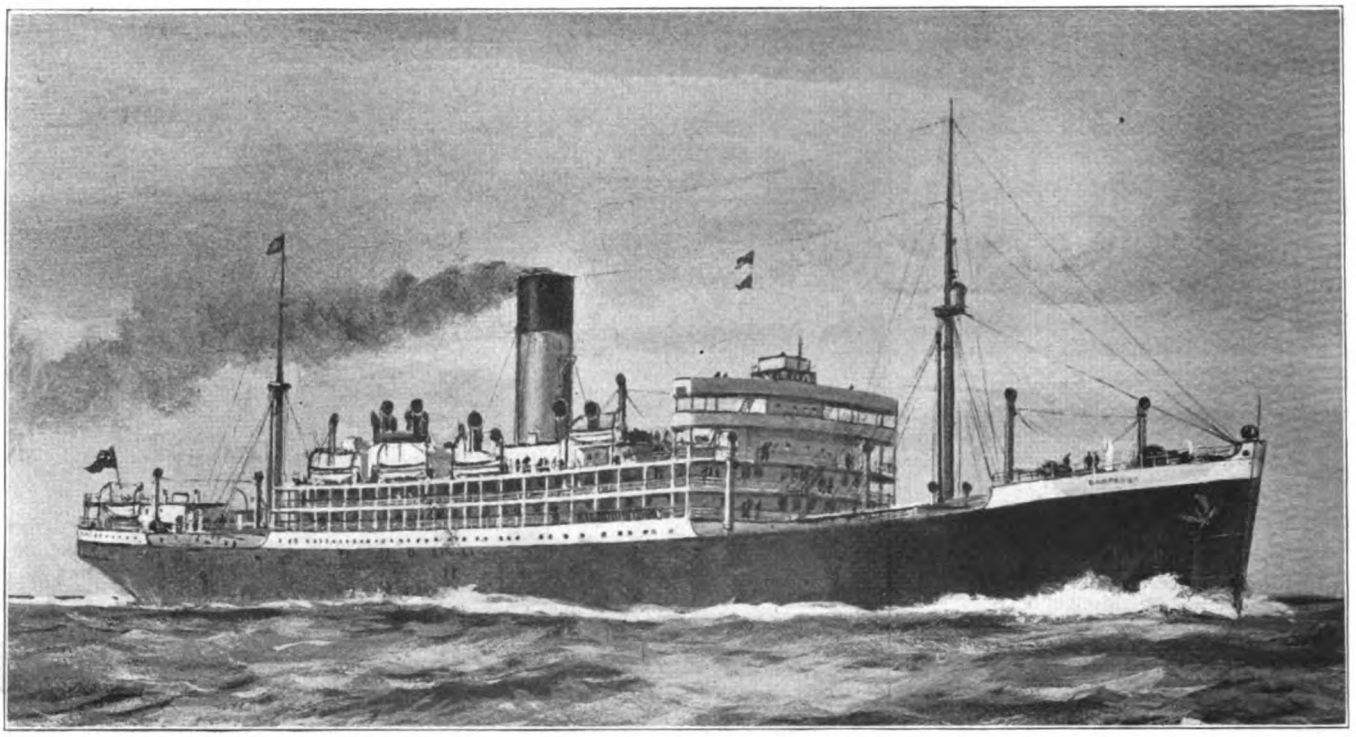


LINER SARPEDON JUST COMPLETED FOR ORIENTAL SERVICE

are situated on the main deck, port side, abreast the engine casing with access from the store passage on the upper deck and to the ship's side by a watertight cargo door above the upper deck.

Fourteen steam winches, 6 electrical winches and 14 pitch pine and 10 steel tubular derricks, including one for lifting 20 tons, are suitably arranged for working the cargo. The electric winches are also available for operating the lifeboats.

Ten large lifeboats are provided giving ample accommodation for all persons on board. The boats are operated by tubular davits with Turnbull's patent turning gear attached and comply with the latest board of trade requirements for lifesaving appliances. A powerful steam windlass for working the anchors and cables is fitted on the forecastle deck, having warping ends fitted for taking hawsers and warps.

Three sets of steam driven dynamos, the engine being of the compound 2-crank enclosed forced lubrication type, are installed at the after end of the engine room between the shafts to supply power to the various electrical appliances and also for lighting the ship.

An oil engine-driven emergency dynamo is fitted abaft of the engine casing on the upper deck for supplying current for lighting, pumping and radiotelegraphy in case of emergency.

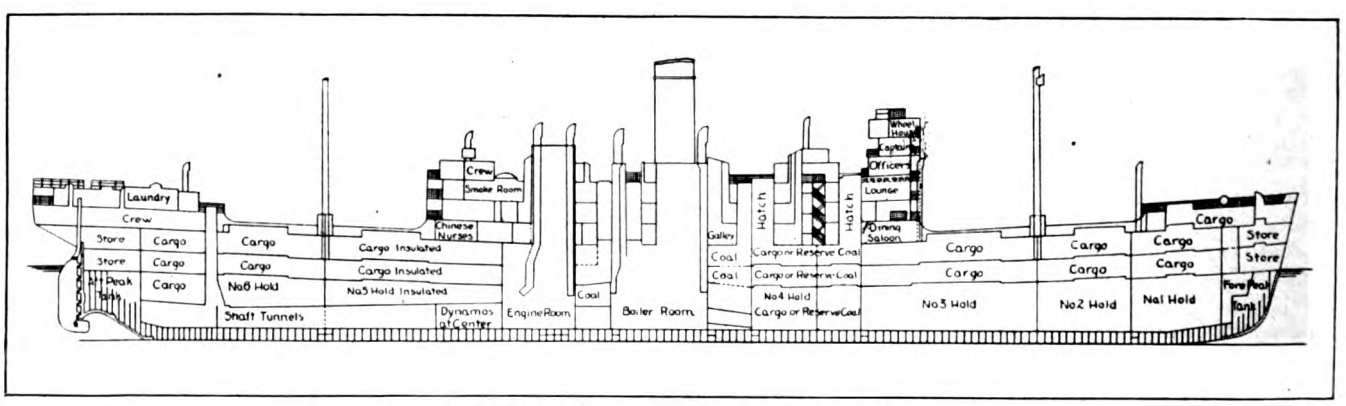
The wireless telegraphy office is situated on the boat deck just aft of the entrance house, together with a cabin for the accommodation of two wireless operators.

One horizontal duplex carbon dioxide machine with its pumps, evaporators, etc., is situated in the shaft tunnel aft of the engine room for supplying brine for cooling the insulated cargo chambers. A separate single carbon dioxide machine is fitted up in the after end of the engine room for supplying brine for the ship's storerooms and cold cupboards.

Accommodation is arranged for 155 first class passengers, only one class being carried, on the promenade and centercastle decks in 1, 2 and 3 berth rooms. The officers are provided for on the boat deck, the engineers and stewards on the upper decks amidships, and the firemen and seamen in the poop.

The first class dining saloon which extends the full breadth of the ship is in the forward end of the centercastle with pantry, galley and service rooms adjoining. The lounge, smoke room and veranda cafe are on the promenade deck where large promenade space is also provided. A large children's play room is provided on the centercastle deck. A hospital is fitted up in a house at the after end of the boat deck. Passengers' bath rooms and lavatories are generally arranged along the center of the vessel adjacent to the cabins and staterooms and are well fitted up.

The decorative work and furnishings throughout are carried out in substantial and tasteful style, all being designed to



INBOARD PROFILE OF NEW 19,400-TON LINER

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give the greatest comfort to the passengers. Efficient natural ventilation is provided throughout and passengers' lavatories, galley and upper deck passages are ventilated by motor-driven fans.

The vessel is propelled by twin screws actuated by single reduction geared turbines of the Brown-Curtis impulse type, capable of developing 8000 shaft horsepower.

Special regard has been paid to the attainment of quick and effective maneuvering of the vessel, the turbines being capable, when going astern, of developing 85 per cent of the service ahead revolutions. Michell thrust blocks are fitted both to the turbines and to the main shafts.

The turbines are supplied with steam at 220 pounds pressure per square inch by three large double-ended cylindrical boilers, worked under Howden's system of forced draft, and superheated to a temperature of 200 degrees Fahr. above that due to the corresponding saturated steam pressure.

In view of the hot climates through which the vessel passes, particular care has been taken to secure the comfort of the engineers by fitting unusually large air hatches and ventilators and by putting specially thick insulation on all hot steam pipes and surfaces.

The Continental Cargo Checking Co. has been organized to handle the checking of cargo on the piers and aboard vessels and cars. Officers will be maintained at the principal seaports from Montreal to Galveston, Tex. J. T. Somers is in charge of the Boston office at 113 State street.

Build French Liner for Central American Route

The CUBA, a handsomely modeled, steel twin screw steamer, has been built and engined by Swan, Hunter & Wigham Richardson, Ltd., at its Neptune works, Newcastle-on-Tyne, England, for the Compagnie Generale Transatlantique of Paris for its mail and passenger service between France and Central America.

The vessel is about 495 feet in length, 62 feet beam and 38 feet depth. She is subdivided for safety in accordance with the rules of the international convention for passenger vessels and has four complete decks besides promenade deck, boat deck and navigation deck.

She is fitted to accommodate 280 first class passengers, 50 second, 250 third class and about 500 emigrants. The accommodation for the first class passengers is luxurious, including staterooms on the shade deck and on the awning deck for 280, there being one, two or three passengers in each room, and every room receiving light and air from the outside and having hot and cold water.

The public rooms for the first class passengers include a large social saloon on the promenade deck, together with a children's room, and entrance hall, a florist's shop and a handsome smoking room, the smoking room and social saloon being connected by a long wide gallery. Aft of the smoking room on this deck is a well sheltered terrace cafe. All these rooms are in a large house amidships. On the awning deck is the first class dining saloon, a large room seating 170 persons. Near it on the same deck is an information office. Public rooms for the first class passengers are decorated by French decorators; the various schemes are well adapted for their purposes and give an excellent effect in every case. The staterooms have been completed at the Neptune works, and are fitted up in various hardwoods, the different rooms being varied in color.

The second class passengers, over 50 in number, have their dining saloon on the awning deck abaft the first class. Their entrance house with smoking room, ladies room and terrace cafe is on the shade deck above. Their staterooms are on the awning deck, some of the rooms holding two passengers, and others four.

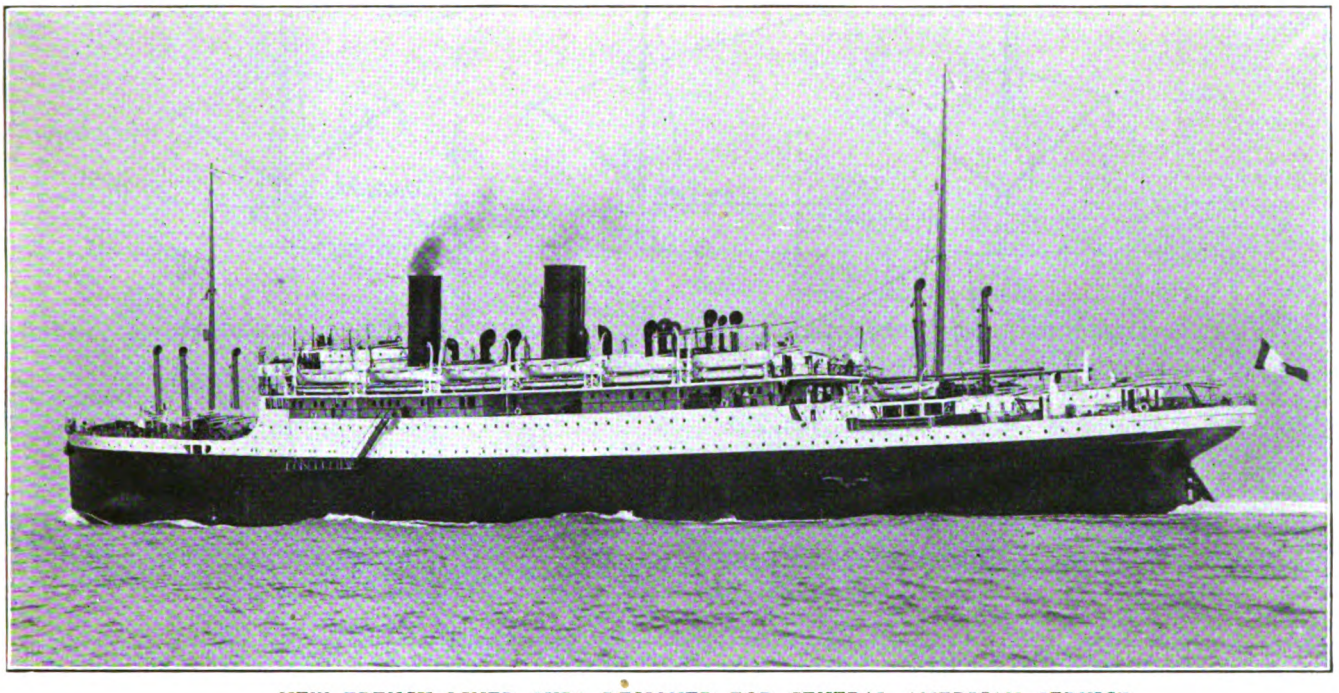
The public rooms for the second class passengers are tastefully finished in polished hardwoods, with furniture to suit.

The third class passengers have their staterooms on the awning deck and upper deck aft, with 2 dining saloons, one forward and one aft. Accommodation is fitted for 254 of these passengers.

On the main deck, spaces forward are adapted either for the use of emigrants, about 500 in number, or to carry cargo, while the holds and various store rooms are aft on the same deck.

Ample hospital accommodation is provided, while there are the usual extensive refrigerated and other store rooms for the ship's use. The galleys and pantries are on a scale suited for the large number of passengers of various classes and are fitted with all the most up-to-date appliances.

The captain, officers, and crew are well provided for, the captain's rooms being on the navigation bridge next to the chart room. A glazed shelter for-



NEW FRENCH LINER CUBA DESIGNED FOR CENTRAL AMERICAN SERVICE

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ward of the chart room is for protection in bad weather. The officers and engineers are on the boat deck, the former in a deck house forward and the latter in a deck house aft.

Wireless telegraphy is fitted in the latest style. Life saving appliances include many lifeboats of steel as well as collapsible boats.

The twin screw machinery supplied by the builders consists of two sets of turbines of the Metropolitan-Vickers type, with double reduction gearing of the three box floating frame type. Steam is supplied by eight large boilers fitted with Rowden's system of forced draft and arranged to burn either coal or oil on the Wallsend-Howden system, two of the boilers being specially arranged so that the change from coal burning to oil burning and the contrary may be made in a few minutes time.

The machinery for working the ship and her cargo is of the most modern and complete type, including two steam capstans, steam steering gear with telemotor control and 10 electric cargo winches.

On the trial trip, the machinery gave entire satisfaction, and a speed of over 17 knots was easily maintained.

The California & Oregon Lumber Co.'s steamer BROOKINGS, formerly COWICHE, purchased from the shipping board, has been repaired by the General Engineering & Drydock Co., with low bid of $1188.

Danes Complete New Motorship

The new Danish motorship SALLY MAERSK was built for the Steamship Co. of 1912, the hull being constructed by the Odense shipyard, Odense, Denmark, and the machinery being built and supplied by Burmeister & Wain, Copenhagen.

The leading particulars of the ship and machinery are summarized in the following particulars:

Type of ship, closed shelterdeck; length bet. perps. feet, inches, 331-4; depth molded to shelterdeck, feet, inches, 28-11; depth molded to upper deck, feet, inches, 21-11; breadth molded, feet, inches, 44-0; displacement loaded, tons, 7260; deadweight capacity, tons, 5200; register gross tonnage, 3252.29; capacity of holds, grain, cubic feet, 271,000; capacity of holds, bales, cubic feet, 243,550; total capacity of fuel oil, tons, 687.25; water ballast in peak tanks, tons, 110.50; fresh water, tons, 25.00; stipulated normal average speed at sea, knots, 10; stipulated normal consumption of fuel oil per day, tons, 4.9;

Machinery:

Type: Burmeister & Wain's 6-cylinder, 4-cycle, long stroke cross-head; cylinder diameter, millimeters, 630; stroke, millimeters, 1300; revolutions per minute, 90; indicated horsepower, 1600.

Trial results:

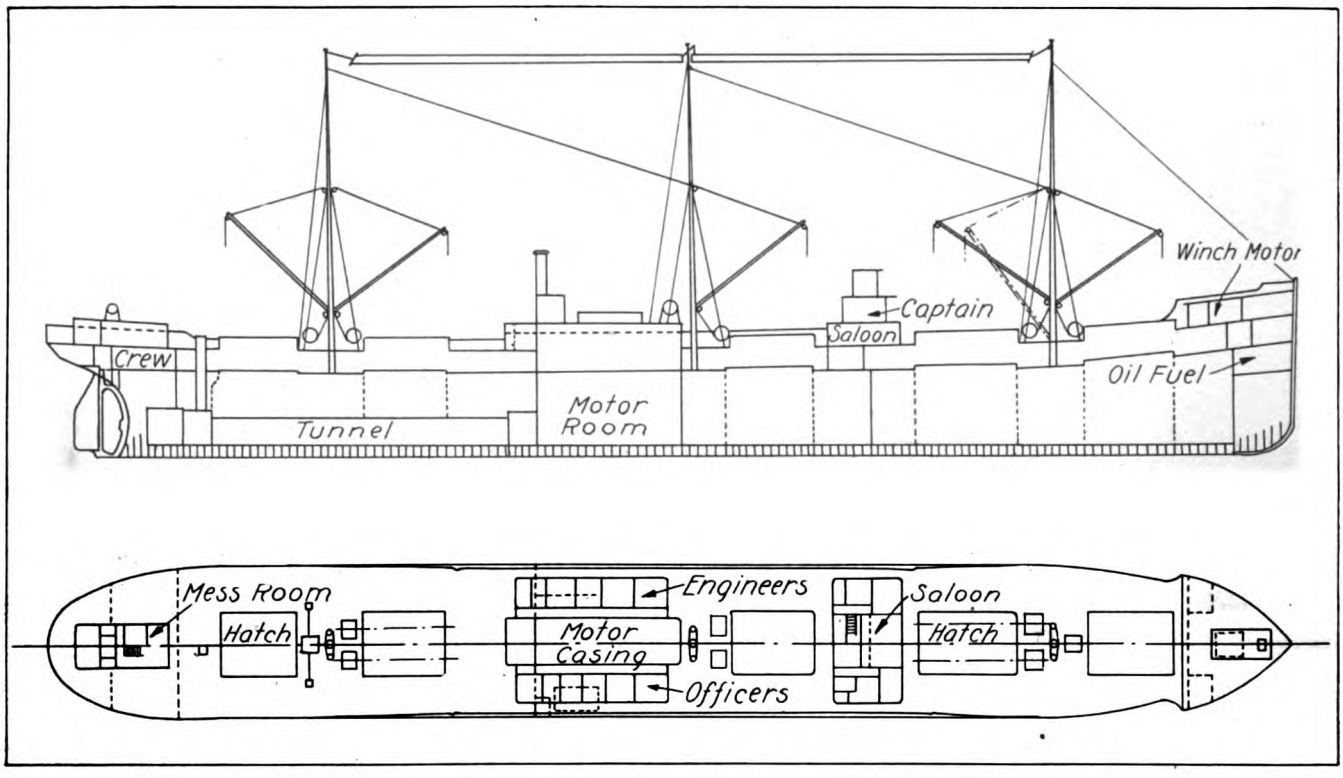
On the trial trip, the results were as follows:

Draft, average, feet, inches, 9-2½; displacement, tons, 2800; indicated horsepower, average, 1685.1; revolutions per minute, 98; speed average, knots, 10.6.

The machinery is placed amidship and is of Burmeister & Wain standard type for single screw ships. The main engine is of the long stroke, forced lubricated crosshead type. The compressor giving the necessary air for injection of the fuel oil is directly coupled to the crankshaft and built together with the main engine.

All auxiliary machinery in the engine room as well as the deck machinery is electrically driven, the necessary current being supplied by three 33 kilowatt diesel dynamos. Each of the generators is sufficient for supplying the necessary current under normal working conditions at sea, while two or all three generators have to be started when the consumption of current is large as when maneuvering or when loading or unloading the winches.

Heating is effected by means of steam produced in a small cross tube boiler having a heating surface of 60 square feet and a working pressure of 50 pounds arranged for oil firing. This boiler also is able to deliver steam for fire extinguishing in the holds.



PROFILE AND PLAN OF SINGLE SCREW, DANISH BUILT MOTORSHIP

CAPT. H. H. BIRKHOLM, until recently resident agent at Seattle for the General Steamship Corp., has been transferred to San Francisco to succeed CAPT. A. T. HUNTER, marine superintendent. Captain Hunter has been appointed marine superintendent at New York for the United States lines.

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Proposed Grain Elevator at Baltimore

Plans have now been devised and approved to replace the two grain elevators of the Baltimore & Ohio railroad at Locust Point, Baltimore, which were destroyed by fire July 2, 1922, by a new elevator which is expected to be one of the most modern in the world. Preliminary contracts have already been let and it is expected that the operation of the plant will start early in 1924. The cost of the installation is expected to be over $4,000,000.

The elevator will be of concrete and steel construction, located inland, with conveyor galleries to both general cargo piers where grain and general cargo can be loaded, and to an additional pier to be built for loading grain cargoes exclusively. At the piers, there will be berths to load eight vessels at one time, four of them for simultaneous loading of general cargo and grain, while the exclusive grain loading pier, 1000 feet in length, will permit the loading of four full grain cargoes at one time. Loading capacity to vessels will be 150,000 bushels per hour. At the end of the grain loading pier, a marine tower will be erected to unload bay boats.

The capacity of the workhouse will be 900,000 bushels. The initial storage capacity of the entire plant will be 3,000,000 bushels, to be increased to 9,000,000 bushels as necessitated by increases in the volume to be handled. The plant will be equipped with four car dumpers for unloading cars with an 8-hour capacity of from 275 to 300 cars. It is estimated that it will be the most rapid grain handling elevator in the world, a car of grain being unloaded and placed in storage in 6 minutes. Loading out capacity will be 200 cars per day. No shifting of cars will be necessary, the cars for unloading being fed into the elevator by a loop arrangement.

Forty-two and forty-eight inch belts will be used to elevate and convey grain to bins and along galleries, while in addition to the four tracks with car dumpers a power shovel track will be provided to unload bulkhead cars or cars not possible to unload on dumpers.

The elevator will be provided with dryers, eight units of 500 bushels each, the hourly drying capacity being from 4000 to 6000 bushels. The dryers will be located over the track shed and will be equipped with four scales of 500 bushels capacity each. The elevator will be equipped with 8 cleaning machines, two oat clippers and Carter disc separators, all of the latest type.

The elevator's cleaning capacity will be 70,000 bushels per hour. In the workhouse, 12 specially built scales will be provided for a working capacity up to 2500 bushels with a garner capacity overhead of 3000 bushels each.

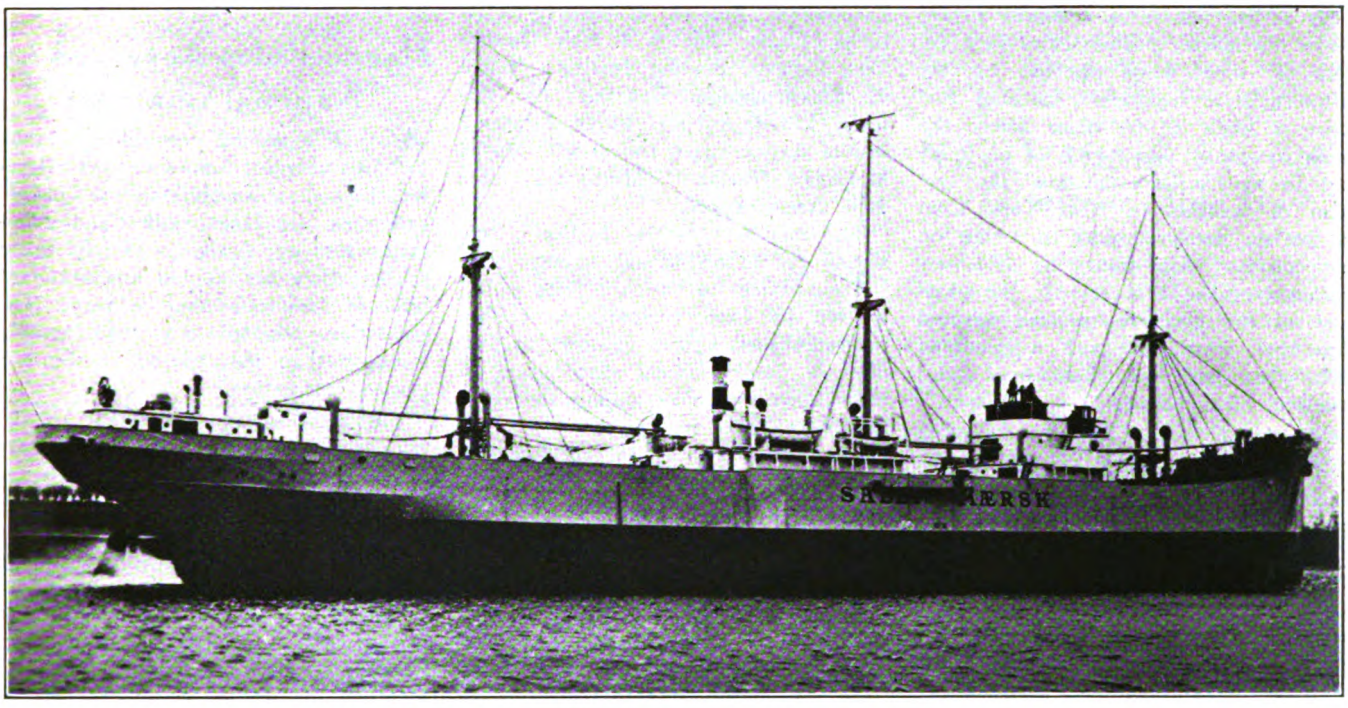
The elevator is to be constructed with every possible provision for the prevention of dust explosions. All points where dust clouds arise are connected with a dust collector system. The elevator legs are vented to the outside air, the vents from basement, under storage tanks, and under workhouse being carried through the elevator to the outside air. There will be a solid bank of windows in the upper stories of the workhouse. The exhaust from the cleaning machines is carried above the workhouse roof and all of the walls will be smooth finish with no ledges to hold dust. The elevator will be equipped with the latest signal, telautograph and telephone equipment.

The receiving yard of the plant will have a capacity of 320 cars and the four load tracks at the elevator a capacity of 80 cars. The empty yard will have a capacity of 105 cars. These capacities are those of yards directly serving the elevator and are in addition to grain tracks in the main Locust Point yard.

There will be in addition a general office building, welfare building, dust house, screening house, machine shop as well as a grain door reclaiming plant.

In the elevator itself, there will be two passenger lifts, a system of indirect lighting used in the dryer, sliding poles for quick movement of workmen, a spiral fire escape, and a complete laboratory for grain testing.

An important feature is that the elevator will be so constructed that each unit of operation works independently of all others.



NEW DANISH MOTORSHIP SALLY MAERSK

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N. Y. Insurance Bills Win Favor

Legislation Favored by Underwriters Even Though Failing of Passage Is Not Actively Opposed

MARINE insurance conditions are not likely to show any marked improvement during the next 12 months due to the fate of bills introduced in the New York legislature at its closing session. Various states in which marine insurance is a factor have been watching the progress of the measures designed to relieve the marine business and as a result of their being shelved by the Empire state legislators, nothing further is likely to be done before the next session. The two bills of interest to underwriters amended the system of taxation in New York from a tax on net premiums to a tax on net profits. Up until the last few minutes of the 1923 session, the passage of the measures seemed assured but they were lost with a batch of bills that had been held over until the end of the session.

While they are disappointed that the bills failed to pass, marine insurance interests are cheered by the fact that no real opposition to the proposed measures developed and that their passage at the next session is almost certain. The fight for the bills was a keen one and underwriters, brokers, the state insurance department, the state tax commission and members of the senate and assembly insurance committees were unanimous in supporting the measures. Underwriters have gained courage from the knowledge that the principle of fair taxation for marine insurance companies has been accepted at Albany. Following a few minor changes in the original draft of the bill tax provisions and regulations governing the placing of marine covers with nonadmitted companies the hills were adjusted in conformity with the views of all concerned.

* * *

Italian Firms Unite To Stop Rate Cutting

A DETERMINED effort to abolish rate cutting in Italy has been put into effect by Italian marine insurance companies through the formation of the Institute of Italian underwriters which has been given well defined supervisory powers over rates with the authority to impose heavy fines for violation. The Institute of Italian underwriters has established headquarters at Geneva. Guiseppe Manzitte and Edoardo Girtanner are chairman and deputy chairman respectively. Members of the institute that have signed the agreement include the Assicurazioni Generali, Cassa Navale & d'Assicurazioni, Comitato per la Mutua copertura dei danna fra Armatori, Compagnia Meridionale d'Assicurazioni, Compagnia Riunite di Sicurta, Costanza, Eagle, Star & British Dominions, Esperia, Fortior, Instituto Italian di Riassicurazioni Generali, La Vittoria, Lloyd Ancora, Lloyd Siciliano, Mutua Assicuratrice Industriale, Mutua Marittima Nazionale, Mutua Nazionale delle Assicurazioni.

The members of the Institute have signed the following agreements:

Commitment to limit the lines underwritten by each company to certain pre-established figures in order to promote a more rational distribution of risks in co-insurance among the companies operating in Italy.

Commitment not to accept lines on Italian risks in reinsurance from non-tariff companies.

Commitment to write the following classes of interests exclusively at the rates, terms and conditions of the "obligatory tariffs" promulgated by the institute:

Time insurance on hulls of steamers, motor vessels and sailing vessels; coffee, coal, cotton, wool, oils, fine, liquors, hides, textiles to the Levant and Central and South America.

Promulgation of a general tariff of rates and conditions for the insurance of all other interests on goods or merchandise against marine risks and all accessory risks, which tariff is intended to be a guide for underwriters; the practical application of this tariff tends to avoid discrepancies of quotations, with the object of eliminating undue competition and irrational rate-cutting in the market.

Commitment for each tariff company to reinsure 10 per cent of every risk on goods and 20 per cent of every risk on hulls underwritten in Italy with the Unione Italiana di Riassicurazione, a new Italian reinsurance company founded in Rome. The purpose of reinsuring the above shares of each risk underwritten by tariff companies in Italy is to enable the reinsurance company to control bordereaux received on the detailed reinsurance, the strict observance of the tariffs, conditions of the insurance and other agreements entered into by the members of the Institute.

The institute has the power of imposing a fine of 100 to 10,000 lira for each violation and each company is required to deposit with the institute 10,000 lira to guarantee the payment of any fines incurred.

* * *

Hague Rules Approved by National Chamber

AT THE annual convention of the Chamber of Commerce of the United States, a resolution was passed endorsing the Hague rules and advocating that appropriate action be taken so that they be adopted and standard bills of lading become a fact. The resolution adopted was considerably stronger than that passed at the last annual convention.

The only serious opposition to the Hague rules was voiced by the American meat packers who have always been against them. This body in a separate resolution recommended that the Hague rules be brought into harmony with the Harter act; and adding to article III, section 6, a proviso that would make a signed receipt bearing notation of shortage or damage equivalent to the written notice of loss or damage, a second proviso should require the carrier to accept and adjust a properly supported claim presented within one year where the accompanying evidence proves that prior notice could not have been given.

* * *

Shipping and Insurance Power Are Inseparable

A GOOD many marine insurance offices have put up their shutters since the business slumped from the glorious peak of heavy premiums and relatively light loss ratio of the hectic war days to the present quiet market. A good many underwriters still feel that there are too many in the field and that while a few well established nationally known houses may be waxing fat the similar offices with their heavy overhead expenses are not. The report of the National Merchant Marine association does not carry with it much comfort for the insurance fraternity. This organization warns that foreign ships are getting three-quarters of American imports and exports.

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It recently issued a circular quoting shipping board figures for February and estimated that American ships are transporting only 35 per cent of the volume of our total sea commerce, 25 per cent of the overseas trade in dry cargo, 39 per cent of the dry cargo trade to the West Indies and vicinity, 29 per cent of foreign trade, excluding tanker movements and trade on the Great Lakes and 60 per cent of oil shipped to and from American ports. Two years ago, a majority of all American exports were carried by vessels under American registry.

While these figures are by no means an accurate index of American insurance, nevertheless the condition is reflected in the volume of business written by American underwriters. American marine insurance is closely linked with domestic shipping and the idea of a strong American insurance market goes hand in hand with that of a robust American merchant marine. Nobody in the marine insurance field dares to prophesy what the situation will be ten years hence.

* * *

Court Rules on Assets of Foreign Company

AN ECHO of the failure of the City Equitable Assurance Co. of London, England, was heard last month in the Supreme Court by Justice Tierney. Suit was brought by the New York marine insurance firm of Carpinter & Baker revolving around the question of the legal rights in connection with the surplus funds of American companies of liquidated foreign insurance companies. The American branch of the City Equitable was taken over by the New York insurance department immediately word was received in this country of the financial embarrassment of the company abroad. Every American creditor was paid in full as a result of the skillful handling of the New York department and there remained in the hands of the state department a considerable surplus fund.

Action was brought by the New York concern, who has been assigned claims to the British American and Western Assurance companies of Canada for about $150,000 due the latter on marine reinsurance treaties with the defunct British company. Under the trust provisions of the American law, only American creditors come under the protection of our courts. Apprehending difficulty in collecting if they were to bring suit in Canada, the British American and Western Assurance assigned their claims to their New York representatives in New York and Carpinter & Baker applied for permission to levy an attachment against the surplus funds held by the New York insurance department.

Opposition was expressed to the granting of permission by the liquidator of the City Equitable abroad who argued that the surplus should be returned to England for distribution there. An English creditor also appeared who claimed a prior right under a mortgage given in return for money advanced to the company. The court upheld the New York firm, who were permitted to levy an attachment. The decision established that a creditor of an insolvent insurance company who is not a citizen of the country of its domicile, may pursue the property of his debtor so far as the surplus in excess of the trust fund is concerned.

In connection with the liquidation of the City Equitable it is noteworthy that the American creditors were paid in full from the deposit required by the state department of insurance. The outcome of the embarrassment of the London company seems to fully justify and reflect considerable credit upon the New York insurance department which requires every foreign company legally admitted to do business in the state to deposit a sufficient fund with the department of guarantee American creditors in the event of the company becoming financially embarrassed in its own country. Insured should always bear in mind when placing their insurance in non-admitted foreign companies that they have no such guarantee upon which to fall back.

* * *

Self-Insurance Alarms Marine Underwriters

A TENDENCY towards self-insurance is causing some alarm among underwriters who report that the practice is slowly gaining headway among large importers, notably chain department stores, whose business is chiefly confined to the movement of goods from western Europe to the United States and whose merchandise is generally carried in the best types of vessels, thus greatly minimizing the hazards to which they are exposed. Underwriters are asking themselves why it is that these importers are open to self-insurance proposition when they are benefiting by low rates and by becoming self-insurers are running the risk of a severe loss which would completely wipe out their insurance reserve and result in a serious net loss.

• The submarine S-24, built by the Electric Boat Co., was launched recently at Quincy, Mass.

Sink Dredge To Bring Court Decision

LEGAL complications developed recently out of an attempt by an underwriting office to enforce a clause refusing the right to abandon a dredge, which sank, on the grounds that she was unseaworthy. The insurers raised her, put the vessel in drydock and subsequently drilled her full of holes which were plugged until the dredge could be taken to the spot where she was raised, there the plugs were removed and the dredge allowed to sink once more. The court held that this action was equivalent to the acceptance of abandonment and judgment was given against the underwriters.

North Pacific Freight Offerings Hold Up

The north Pacific charter market is strong in some directions and inactive in others. The Oriental, Australian and southern California berths are firm while improvement is indicated in the European, South American and intercoastal routes.

Exporters are still shipping enormous quantities of forest products to Japan and transpacific lumber rates are strong at $1.50 to $13.50, conference rates, while tramp steamers are asking $1 above these levels. To Australia, the lumber rate is well sustained at $15 and $16. Several sailers have been fixed for this trade during the month while large exporting houses have covered their requirements by chartering a number of steamers on time. The westbound Pacific conference has raised the wheat rate to the Orient from $5 to $6 per short ton, effective Aug. 1 and the situation on this berth may justify other increases in the near future.

Reorganization of the intercoastal conference, on which route open rates have prevailed during last year, is expected to result in an average advance of 25 to 30 per cent effective in July or August. The lumber situation, however, is weak at present, parcel space being freely offered at $13. As a rule, shippers have committed themselves for more space than they can use.

Charter of a British steamer for prompt loading of wheat from the Columbia river to the United Kingdom at 38s 9d interested the market. For new crop grain shippers are not willing to offer more than 35s while owners are asking 40s or more. Activity in this market is expected soon. While the movement of general cargo to northern Europe is inactive at present, this berth will be busy within 60 days when seasonal freight begins to move.

Continued activity is the outstanding feature of the southern California berth.

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Practical Ideas for the Engineer

Experts Study Handling of Coal on Ships—Removing Oil Residue—Preserving Paint Brushes

THE seriousness of fires on ships due to spontaneous combustion in bunker and cargo coal has led the department of the interior to undertake a study of causes and means of prevention, results of which are given in Technical Paper 326, by H. H. Stoek, just issued by the bureau of mines.

A tabulation of casualties from fires on British ships shows that the number of fires caused annually by spontaneous combustion ranges between 50 and 100. The average number of American steamers totally destroyed by fire each year is more than 60. In addition, about 140 vessels of miscellaneous types are destroyed, a total of 200 per year. Property losses by fires on ships run into the millions of dollars. Loss of life has been considerable. The portion of these totals attributable to coal fires has not been ascertained.

The money losses listed do not include those due to delays in sailing incident to the heating of coal cargoes or to the cost of removing cargoes that have heated. In New York harbor, coal that has heated to 120 degrees is frequently refused for bunker and cargo purposes and has to be disposed of otherwise. Within the last few years, coal handlers in several South American ports have required extra pay for handling coal that has heated.

Spontaneous Combustion Hazard

As a result of its investigations, the bureau of mines considers that the danger of loss of life or of a total loss or damage to vessels from coal carried in bunkers or as cargo is sufficient to require great care in choosing, handling, and watching coal placed on ships.

There is undoubtedly a difference in liabiliy to spontaneous combustion with different coals, but data available at this time do not permit a classification of coal to be made upon this basis. Hence, when a choice is possible, a coal that, as shown by its past record, is particularly liable to spontaneous combustion should not be put on a ship. If choice is not possible, and coal with a bad history must be used, especial care should be taken in stowing and watching it.

Liability to spontaneous combustion is greatly reduced if fine coal and dust be removed by screening, but this is usually not practicable with present coaling methods and because run-of-mine coal is generally furnished to ships, particularly at American ports, both for cargo and bunker purposes. This requires that extra precautions be taken. The least friable of the coals available should be chosen, if possible, and care used in handling the coal to minimize breakage and crushing.

It is wise to select a low-sulphur coal, if possible; but it must not be taken for granted that a low-sulphur coal will be free from spontaneous combustion.

The evidence in regard to the chemical action of moisture in coal in aiding or retarding spontaneous combustion is very contradictory. As vessels must usually be coaled promptly, no attention can be paid to weather conditions, and it seems to make little difference as to the tendency to fire whether coal is loaded in wet or in dry weather.

Practice and opinions vary widely in regard to the ventilation of bunkers and holds. Many advocate keeping the coal spaces as nearly airtight as possible by battening down the hatches, but others advocate taking off the hatch covers, when weather conditions permit, to provide surface ventilation. Adequate ventilation throughout a coal cargo by pipes or by ventilating chimneys of coarse coal through the pile, as advocated by some, is impracticable, and it seems better to distribute the coal uniformly and to prevent as far as possible segregation of the sizes, as such segregation tends to produce areas favorable to heating. Moist air circulating through a coal pile seems to lower its temperature of ignition. Ventilating funnels should be provided in connection with bunkers and holds to carry off any explosive gases given off by some coals, and great care should be observed in opening a bunker or hold that has been tightly closed to test for explosive gases. Open lights should be prohibited in closed spaces where coal is stored.

Further recommendations of the bureau of mines' investigators are as follows: When coal is loaded, trim it, if possible, in horizontal layers to avoid separation of the sizes, rather than dump it on a cone and thus permit large lumps to roll to the bottom of the cone and the fine coal to collect near the top of the pile, just under the hatches, where fires are often known to start.

Thoroughly clean out bunkers and holds before fresh coal is put in, and closely inspect coal as it is being loaded, removing from it any waste or pieces of wood, paper, or similar combustible material which may assist spontaneous combustion .

The placing of fresh coal on old coal that has been in the bunker for some time is generally considered unwise.

Keep the coal as cool as possible, and avoid placing it in contact with outside sources of heat, such as steam pipes and hot-air ducts. Protect bunkers from the heat of boilers and engines.

Take the temperature of the coal at regular intervals, the oftener the better, if there is any tendency to heat. If the temperature reaches 100 degrees Fahr., and is rising rapidly, move the coal to cool it off by contact with air, steam, or, in extreme cases, water. If water is used, burn the coal as soon as possible and keep it separate from the other coal, as the application of water to hot coal breaks it up and by thus exposing fresh surfaces renders it more liable to spontaneous combustion.

Preventive Methods

Provide an adequate steam supply, hose, pumps, and other fire-fighting equipment, and always keep them ready for use. Some automatic fire-detecting apparatus in the pilot house or engine room is advisable.

Provide for the egress, before men enter places where coal is kept, of explosive and other gases that are given off by coal, and avoid open lights in cargo and bunker spaces. Clean the vents leading from bunker or cargo spaces after coal has been put in place.

Clean out thoroughly, when the ship goes out of commission, all spaces where coal has been kept, as fine coal left in corners and on ledges frequently fires. Do not run electric wiring, unless in metal conduits, through spaces in which coal is placed. Use every precaution to prevent sparking at electric contacts.

Copies of Technical Paper 326 may be obtained from the department of the interior, bureau of mines at Washington.

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Color Influences Fouling of Ships' Bottoms

The fouling of ships' bottoms is a problem that never leaves the owner or the officer, and any experiment in the direction of minimizing the evil is of the greatest interest to anybody who has anything to do with the sea and shipping. The latest experiment in this direction, says the Liverpool, England, *Journal of Commerce*, have just been carried out by the officials of the Beaufort laboratory, and certainly have produced very interesting results.

Every effort was made to prevent any of the plates tested having the slightest advantage over the others in the matter of conditions, and the tests were carried on over several months, and very largely had to do with the color of the anti-fouling composition used. The composition was the same in every case, except in the matter of pigment, and the colors used were white, black, yellow, red, green, and blue. While many would dislike to see a ship at sea with a bright yellow boot-topping, especially if it clashed with her funnel paint, perhaps, a bright red, it was useful for the purposes of general experiment. As far as the under-water fouling was concerned the results certainly justified the experiment, and showed that color had a tremendous influence on barnacles and hydroids. The black plates fouled the most quickly and the most thickly, and after them the colors were graded down strictly according to their shade until the white ones were practically clean, even after several months' immersion. Up to now, the white boot-topping of certain sailing yachts has been regarded almost entirely as a matter of appearance, but there are possibilities of race-winning in it as well.

Of course, these are not by any means the first interesting tests that have been carried out in the matter of the fouling of ships. In 1865, for instance, a gentleman named Brown came forward with quite a good idea, which was taken up by a big London firm and given a thorough test. His scheme was to coat the bottom of a ship completely with coarse glass as a preventive against marine growths, and he persuaded the admiralty to let him try the experiment on the bottom of her Majesty's screw storeship, BUFFALO. Soon after, the P. and O. company submitted its screw packet ELLORA to the same treatment, but although the price of one shilling and sixpence per square foot for material and fixing was not out of the way under the circumstances, the plan was not a great success, especially when a ship had to be docked, and it was not repeated.

Among numerous other experiments the one that stands out as being of the greatest interest was carried out on the American side of the Atlantic in 1895, when the bottom of the steam tug ASSISTANCE was completely electroplated. She carried on her ordinary duties for four years, and at the end of that time she was drydocked and found to be perfectly clean. Here again the experiment was not repeated, probably on account of the cost, but one can not help thinking that after all the heavy expenditure might have been totally unnecessary, for in view of the latest tests the freedom from fouling may have been simply and solely due to the fact that an electroplated hull would naturally be very light in color. All these experiments are interesting, and it is to be hoped that the matter of the color will be taken very much further, in the solution of a time old problem for it appears to be both economical and efficient.

Removing Oil Residue from Ship Tanks

FUEL oil in place of coal for firing boilers on board ship in addition to giving greater thermal efficiency resulting in material economy in cost (though this advantage is subject to great fluctuation, and may be wiped out or reversed with change in price of oil) is superior to coal in so many other respects that it is becoming more and more generally used. The advantages may be enumerated as follows:

1 Ease, rapidity and cleanliness in bunkering.

2. Mechanical methods of firing and transfer, eliminating, the heavy work of trimming and firing and removal of ashes, with attendant dirt and confusion, care and upkeep of grates and bridge walls, dirt and heat in the fire room.

3. Economy in carrying space by complete stowage and use of double bottoms.

4 Much easier to maintain steam and to force the boilers when necessary.

A direct benefit consequently is a much more contented fire room crew.

The disadvantages have gradually through experience come to be well recognized and may be noted in order of their importance.

1 The cleaning of tanks and double bottoms in which oil has been carried in order to effect repairs or periodically to remove residue so that full capacity of tanks may be available for a fresh, clean supply of oil.

2 Unavoidable mixture of oil with water in the bilge and ballast discharge and its segregation as it is not permitted on account of the ensuing pollution to pump such mixtures overboard within harbor limits.

3 Increased hazard of fire and explosion, though with the exercises of ordinary precaution this danger has not proved really serious in actual practice.

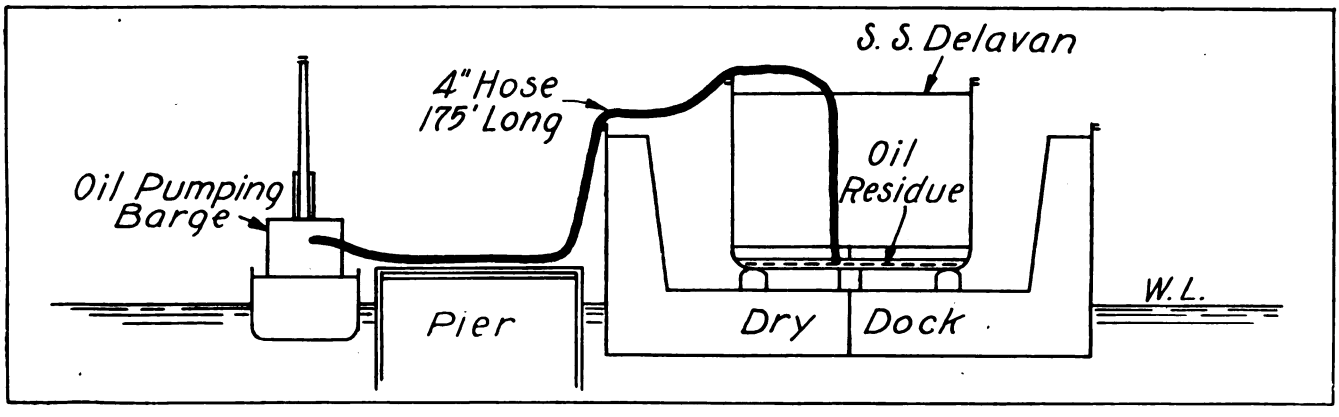

FIG. 1—SKETCH SHOWING HOW OIL RESIDUE IS REMOVED FROM VESSEL IN DRYDOCK

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4 The necessity of heating the oil when the temperature is so low that it can not be pumped.

5 Additional pumps, piping and suctions for transfer and oil service.

6 It is easier on the whole to procure coal in remote and lesser ports of the world, though bunker stations supplying oil have and are being established all over in increasing number to take care of bunkering needs.

The principal and most trying disadvantage to the ship operator and ship repair concern is probably the difficulty and time consumed in cleaning out fuel oil tanks of the residue, an extremely heavy, thick jellied substance which can not be pumped. At first, this work was accomplished solely by hand, that is, by sending into the tank or tanks as many men as could conveniently work in the space. The residue was shoveled into buckets which in turn were emptied into barrels and these barrels hoisted over the side and placed on a barge or dock later to be disposed of in any manner possible. It was then necessary to steam these tanks out until the dangerous gases had been eliminated. This process is necessarily exceedingly slow and costly, and in this day of modern mechanical appliances for almost every conceivable operation seems hopelessly crude and uneconomical.

In order to accomplish this work in an approved mechanical manner, the H. J. Wheeler Salvage Co., Brooklyn, N. Y., some time ago worked out and placed in actual operation a mechanical system for removing fuel oil residue and any water or foreign matter. This system has been described in more or less detail before but it may be worth while to point out here the fundamental features.

The accompanying illustration, Fig. 1, shows a diagrammatic sketch in section of a ship in drydock with oil residue being removed. A pump on board the scow maintains a vacuum of about 20 inches in the line and in each of the two cylindrical tanks in turn, placed on the deck. The tanks are connected to the compartment from which the oil residue is to be discharged by a flexible metal hose. On the end of this hose is fitted an ordinary reducing coupling with a short section of pipe screwed into the smaller end and the larger end secured to the flexible hose. Small holes are drilled into the periphery of the reducing coupling where it swells from the smaller to the larger size.

The 20-inch vacuum maintained being practically two-thirds of a full vacuum would of itself only raise a column of liquid of the density of water (and the oil residue is of greater or the same density) to a height of around 22 feet. By submerging the short section of pipe screwed into the reducing coupling at the end of the flexible metallic hose so that the small holes in the union are above the surface of the oil residue, the inrush of air through these holes due to the partial vacuum maintained in the line, effectively breaks up the heavy oil residue into fine particles. These become suspended and mixed with the rapidly moving stream of air in the hose and thus broken up into a spray become many times lighter than in the original state, and in this condition has in actual practice been raised against a head of over 65 feet.

The air which rushes into the hose line being taken from the compartment from which the oil residue is to be removed not only serves the useful purpose of breaking up the heavy oil but draws with it the dangerous combustible gas fumes generated by the oil and thus effectively ventilates the tank so that it is claimed there is no further danger from gas fumes to life or as an explosive mixture. Formerly thorough steaming of the tanks taking a considerable time was necessary in order to remove these gases before any work could be carried out in such compartments. Two distinct advantages thus accrue from the use of this mechanical method of oil residue removal, as the solid oil and gases are removed simultaneously and rapidly.

Fig. 2 illustrates three of the barges alongside a ship removing the heavy oil residue, making the tank or tanks

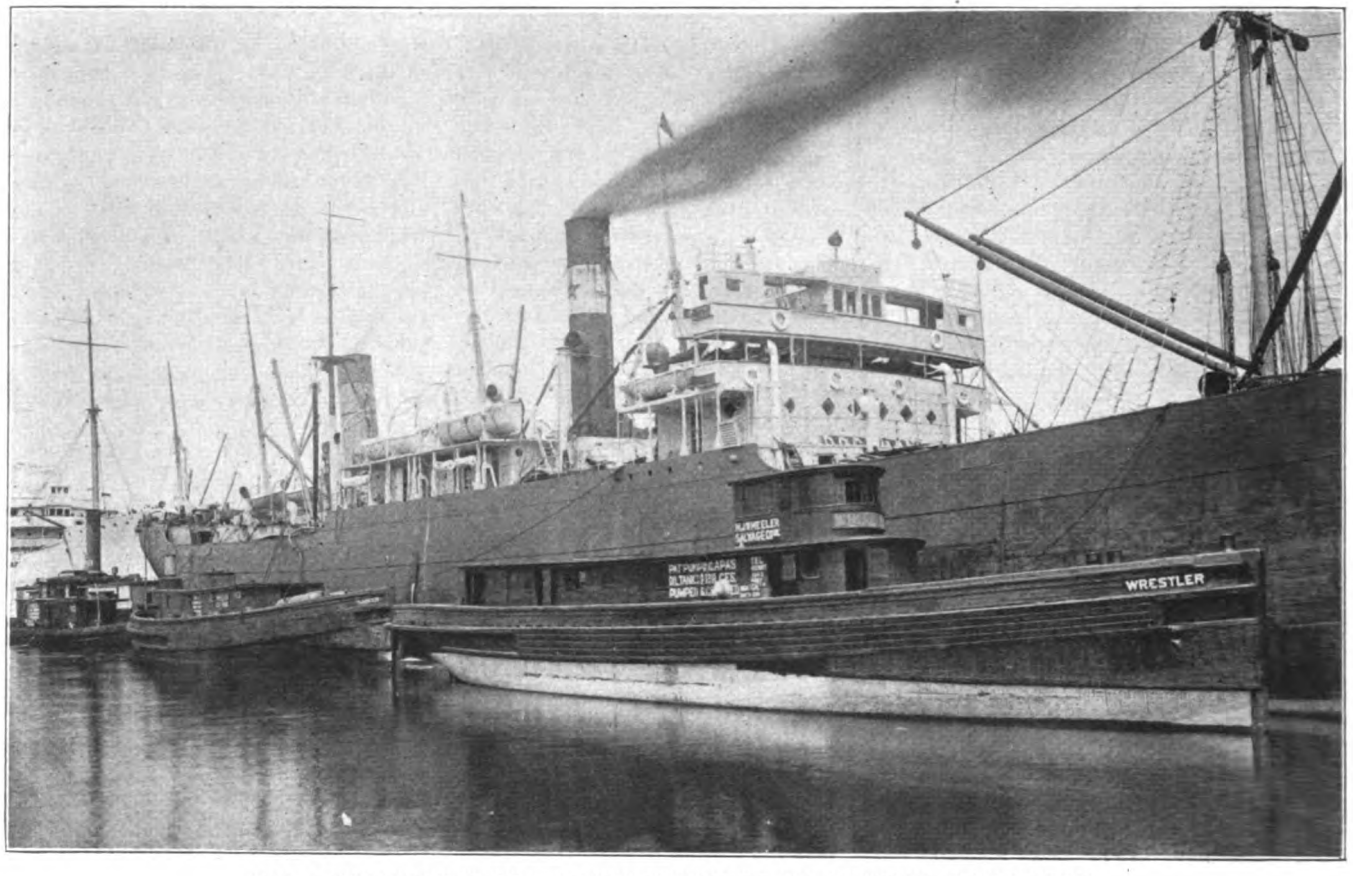

FIG. 2—GROUP OF THREE BARGES REMOVING OIL RESIDUE FROM VESSEL

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ready for repairs or further service.

The line drawing shown in Fig. 3 illustrates a typical oil cleaning barge, with apparatus installed, suitable as a unit in the regular floating equipment of a large steamship company or shipyard or for a private individual or company making a business of doing this work for steamship companies and repair yards in any port where the amount of shipping and ship repairs would warrant. The H. J. Wheeler Salvage Co., 224 Bush street, Brooklyn, N. Y., has patented the system and grant an exclusive license to an individual or firm for the construction and operation of a barge in a specified territory for cleaning tanks under its system.

The principal characteristics of the outfit is preferably a steel barge of suitable type with its hull arranged for the stowage of a fair quantity (in the plan, Fig. 3, the quantity is 350 tons) of the residue oil. A boiler located on deck in a house, burns the fuel oil salvaged from the ship and furnishes steam. Two cylindrical tanks on deck are piped to a steam vacuum pump. There is also an air reservoir tank, a compressor and an overboard discharge pump. The barge is fitted with all the necessary piping and a supply of flexible steel hose. After the oil residue which is to be removed has been split up into oil spray and drawn into the cylindrical receiving tanks on deck, it is forced from these tanks in turn into the hull of the barge, by compressed air. The water will settle out and can be pumped overboard, and the remainder is fit for use in burning under the boiler on board and for commerical use ashore under boilers. The fuel for operating the machinery of the barge consequently costs nothing as it is an incidental by-product of the process.

Will Form Safety Code for Forging Industry

The formulation of a national safety code for the forging industry will be undertaken immediately as a result of the decision of a conference of the principal organizations interested in the subject recently held at New York on the call of the American engineering standards committee under whose procedure the code will be developed.

The conference by resolution requested that the code include the hazards of drop forging and other hammer forging as well as all hazards peculiar to the forging industry and associated with the machines used in the industry whether or not they occur at the point of operation.

The same resolution suggested that the code do not include the hazards of cold extrusion of nonferrous metals, or hydraulic presses, except as the sectional committee may find it desirable to include small types of the latter and that the inclusion of hot pressing, bulldozing, and other forging operation, such as those of bolt-heading and rivet-making machines, be left to the discretion of the sectional committee.

The safety code correlating committee, which acts in an advisory capacity to the American engineering standards committee, has formally recommended that the code be developed under the joint sponsorship of the National Safety council and the American Drop Forging institute.

The conference also passed a resolution declaring that a national code for plate and sheet metal working is desirable, but that its formulation should not be undertaken at the present time, since to do so would likely interfere with the prompt development of the proposed forging code, because to a large extent the same organizations and individuals would be interested in both codes.

The following organizations were represented at the conference: American Car & Foundry Co.; American Society of Mechanical Engineers; American Society of Safety Engineers; Baldwin Locomotive Works; Bethlehem Steel Co.; Copper & Brass Research association; Electrical Manufacturers council; Hollow Metal Door society; Lima Locomotive Co.; National Council of Lighting Fixture Manufacturers, New York division; Railway Car Manufacturers association; Rolling Steel Door association; Master Blacksmiths' association; National Association of Mutual Casualty companies; National Bureau of Casualty and Surety underwriters; Na-

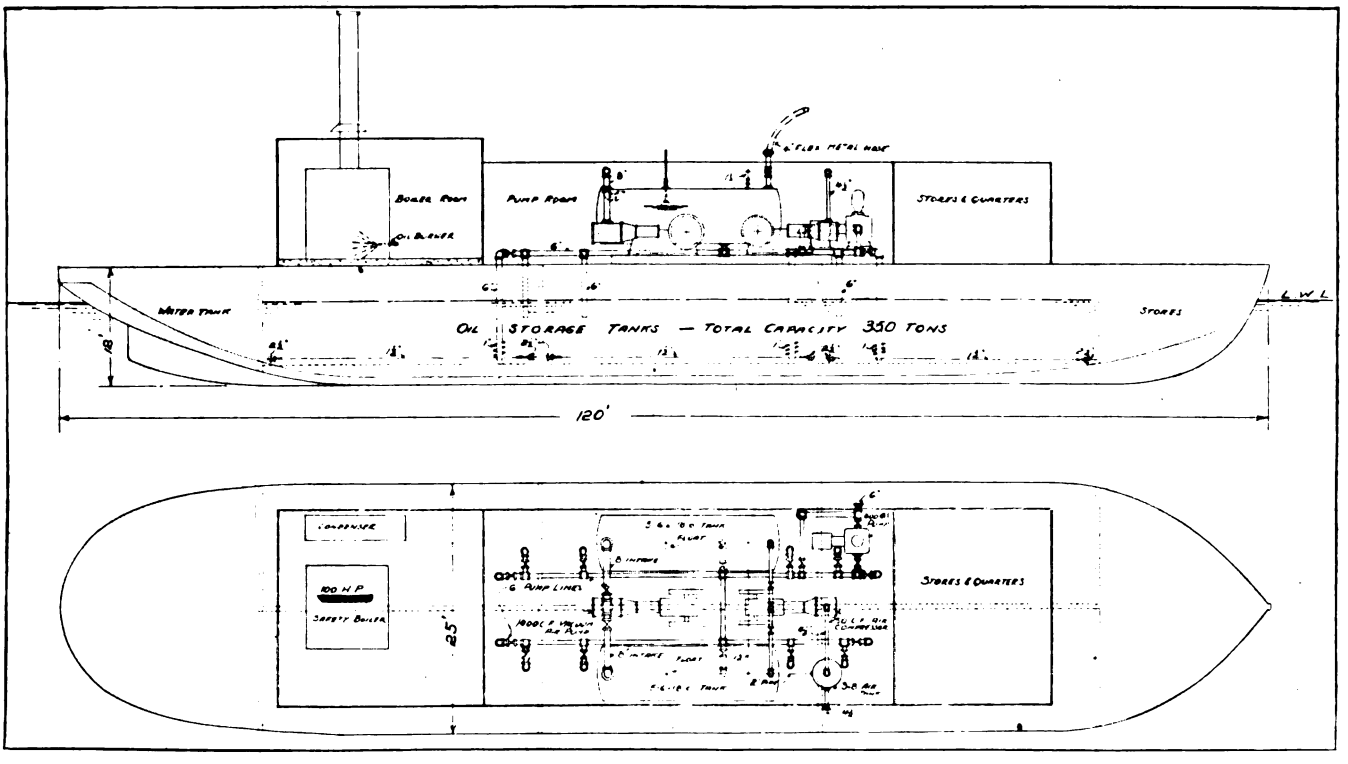

FIG. 3—GENERAL LAYOUT OF OIL CLEANING AND SCALING BARGE

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tional Industrial Conference board; National Safety council, New York & New Jersey Dry Dock association;. New York state department of labor; Safety Code Correlating committee; Society of Naval Architects and Marine Engineers; United States bureau of standards; United States department of labor; J. H. Williams & Co.; Virginia commissioner of labor.

CAPT. N. B. KELLY, pilot commissioner at Boston since September 1920, has resigned his position owing to ill health, and CAPT. W. A. CARLETON, Plymouth, Mass., has been appointed to succeed him.

New Method of Finding Positions at Sea

The hydrographic office of the navy department, according to G. W. Littlehales, the hydrographic engineer who devised the method, has reported a new system for determining latitude and longitude by which positions may be determined within three minutes, while present methods are usually a rather tedious procedure. This method represents three years of work and involves more than 1,500,000 calculations, and the solution of a great many spherical triangles. New tables, the results of this work, when issued, according to naval experts, will be of particular value in determining quickly the position of fast moving water and air craft.

All the essential data needed for making calculations under the new system is contained in a single compact volume. The book will give in tabulated form the hour angles and azimuths for every degree of latitude ot any celestial body, visible to an observer between 60 degrees north latitude and 60 degrees south, the limits within which practically all navigation is carried on.

How to Choose and Preserve Brushes

BY CAPT. E. ARMITAGE McCANN

IN PURCHASING brushes of all kinds, one has to exercise the qualities of faith and hope; hope that one gets what one pays for of which the best assurance is the integrity of the firm from which one buys, and faith in their word that they are the best for their several purposes.

Any collection of bristle, hair or fiber bound together is a brush but is not necessarily a good one, and though it may be good for one kind of work it may not suit some other. At a glance all paint brushes appear fairly much alike, but a few simple tests will soon detect inferiority if it is very evident. Cheapness can to a considerable extent be easily smuggled into a brush, only to be found out when it has been brought into service, so that it pays to deal with a reputable firm and, of course, pay them a fair price, without which nobody can sell good gear.

It must be emphasized that brushes of the best quality are by far the most economical, because in the first place they will wear better and, much more important, their cost is as nothing to the cost of labor in using them, and bad brushes means slow and poor work. Though in aboard ship work the cost of labor is not put down on time sheets and charged against the job as in contract work, it has to be paid for nevertheless in wages and food. This is all too frequently forgotten.

To detect in some degree, the good from the bad brushes it is necessary to know what constitutes a good brush and what are used as adulterants.

The best brushes are made of bristle, which is the hairy covering of pigs, badgers, sables (or badgers), oxen, squirrels, goats, skunk, bears, etc. Each is good for its own special purpose. For example the sable bristle is the best for water-color painting, but for ship work the pig bristle can not be excelled. The best of these is from the wild pig, or boar, which is found in Spain, Austria, Germany, India, Russia and China, the majority of the bristle being collected in the two latter countries, but just how they are obtained in such large quantities, history does not tell us. The winter growth is much stiffer and longer than the summer, sometimes being as much as 13 inches in length. White bristles are in no way, except in appearance, better than the black, but are dearer, for which reason the black are sometimes bleached making them inferior.

Bristles are specially suitable for paint brushes because of their elasticity, which with proper usage never leaves them; for the manner in which they taper to a fine point; for their jagged or serrated edges which holds the paint and for their split ends called "flag" which smooths the paint out. In this latter the Russian bristle is said to excel.

Some short bristles mixed with the long ones are rather an advantage as they reduce the cost and their flag in the upper parts of the brush helps in holding and distributing the paint.

One of the commonest adulterants is horse hair, as the prime cost of this is much less, it is bought in long lengths and can be cut to any required length, whereas the bristle has to be graded by its natural length and the longer it runs the more it costs by weight. Horsehair has not the same spring or strength neither does it taper, nor have the flagged ends.

Other adulterants are various kinds of fiber, from the Mexican agave and aloe, manila hemp, cocoanut fiber and such like. This is usually bleached nice and white but has little value for painting purposes as it is inelastic, absorbent and breaks readily.

The test for bristle is first and foremost its spring which is greater than that of horsehair or fiber. Fiber burns readily, but bristle only splutters and curls.

Under the microscope, bristle is cellular and of elliptical section, horse hair is noncellular and round; most of the fibers are flat in section. Square cut off ends in a brush is a sure sign of horse hair adulteration.

Small brushes are best set in vulcanized rubber, but this is generally considered to be not so good for the larger kinds, as the heat is inclined to lessen the spring and the great pressure to destroy the cells. Some of the newer processes are said to require less heat than was formerly employed.

Many other methods of mounting the bristles are used, such as wedging them with glue or cement into metal ferrules, or the old fashioned way of binding them with fine cord and wedging them tight with the handle. For the larger type of brush this method still holds its own.

For varnishing, the best kind is a 3 inch, flat, chisel-pointed brush, very elastic, of good substance and solid. For paint, the oval or round kind are better not too solid at the top but nicely graduated and more or less pointed. For lime washing or any water paints, the glue-set brushes should not be used, nor should they be left standing in water.

Quite as important as having good brushes to start with is the care of them, because if not properly looked after, they will rapidly deteriorate. This is fair neither to the maker, owner nor the user. A little time spent in attention to them is a big economy in making them last and do their work well and quickly.

Before the brushes come into use at all, the matter of their storage should be considered. Bristle, in its cellular formation, carries a natural oil which

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adds to its elasticity and makes it friendly to the oils and other ingredients of paint and varnish. If kept in too dry a place, this oil will harden and create a stiffness and harshness which causes the bristle to become scratchy and destroys its affinity for the medium in which it is to be used; on the other hand, too much moisture will equally destroy the elasticity by swelling the cells and letting the oil exude. In either case, once this so important suppleness is gone it is impossible to restore it, so that the atmospheric state of the brush locker is important: a position that would keep tobacco in good condition would be about right.

Varnish brushes require the most care when in use as they are as a rule of better quality and have to do finer work. The best method is to hang each brush in the kind of varnish it is used for. This will keep it in good condition and it will be ready for immediate use. The varnish can be changed once a month or so, and the refuse used for undercoating and rough work. A mixture of oil and turpentine is not good, as it has no flow to carry the grit away and so drives it into the brush, it has to be thoroughly rubbed out before the brush can be used and is of no value as waste.

Paint brushes may be kept in oil or water. The latter is considered as good as the former provided they are not left there too long and have been in use. The brushes should be hung in the medium and not left standing on their ends. The easiest way to do this is to bore a small hole in the handles and thread a wire through, which rests on the edge of the pot so that only the bristles are in the water. Should they become flabby through accidentally being left too long in the water, the stiffness may to some extent be restored by using them in turpentine paint.

A better method of temporary storage is to wrap them in wet paper, this excludes the air and keeps them soft and is not so liable to spoil them as is the water or oil.

No brushes should be left in turpentine or kerosene.

When painting finishes for the day, the pots should be emptied into the container drum, and then wiped out with the brush. Finally, the brush should be scraped out and rubbed off on a piece of board or elsewhere and then hung in its pot of water, one pot for one color.

Do not clean brushes with paint or varnish remover, it is expensive and injures the bristles, making them flabby. If not hard rinse them in turpentine or kerosene, wash them in warm soap and water and thoroughly rinse in clear water, then twirling the brush to expel the water. If hard all through, soak them in dilute ammonia or hot oil until soft, then rinse in turpentine and wash as before, or make a paste of washing powder and leave them in it all night. Before placing the brush in any hot solution, wrap the bristles in paper to preserve the shape and see that the ferrules are not immersed. The worst way a brush can be treated is to boil it. Lye (caustic soda) will remove paint readily but it also ruins the brush. Some of the newer brush cleaning powders do their work very efficiently and are guaranteed not to spoil the brush and do not appear to harm them much.

There is, of course, no remedy equal to prevention, therefore, the wise man has his brushes frequently and thoroughly washed out, properly dried and carefully stored. In this way, they are always in good condition and ready for use. A boy can do this and a man will work more efficiently with a clean brush.

To sum up, good brushes for their several purposes, whether sweeping a deck, painting, varnishing, or picture making, should be requisitioned and insisted upon. Once received, they should have their need of attention and care, for this is efficiency and that is one of the crying needs of our mercantile marine.

Develops New Method of Avoiding Collisions

An English professor, John Joly, has worked out a practical method by which collision can be avoided between two ships equipped with machinery for wireless and submarine signalling, however obscure and stormy the weather. To understand it, consider first of all two-ships, one of which is proceeding due north, while the other is proceeding due south, each at a fixed rate.

They will collide only if their courses are in the same straight line. In this case, the rate at which they are approaching one another remains the same from minute to minute, and is greater than it would be if their directions and speeds were unaltered, but they were not in the same line. For example, if the ships are passing abeam, they remain at about the same distance for a short time, and the rate of approach is zero, while even before and after the moment when they are abeam the rate of approach, though greater, is always less than the sum of their speeds.

In general, on whatever straight courses the ships are proceeding, if they are heading for collision they approach one another at a perfectly definite rate, easily calculated from their speeds and directions; if they are going to pass safely, the rate at which they draw near is less, and also varies from minute to minute. Hence, to know if collision is likely to occur if the ships hold on their courses, the navigator must know his own course and rate, those of the other ship, and also the rate at which the distance between the ships decreases from minute to minute.

How Position is Calculated

The courses and rates are communicated by wireless. The distance apart at any instance can be fixed by a system of submarine sound signalling. For if the submarine bell on one ship be struck at the same moment as a wireless "dot" be sent out, the interval between the arrival of the two signals at the other ship gives the distance, since the wireless signal travels, for all practical purposes instantaneously, while the sound travels through water at a fixed speed approaching a mile a second. Accurate methods are available to measure this interval, the distance apart being determined in this way every minute. The navigators can soon decide if the ships are steadily approaching one another at the rate which indicates danger, and, if so, decide on the appropriate change of course. A routine can easily be mapped out which makes the method of taking and interpreting the signals easy even in emergency conditions. The near future may see some mechanism for the production and reception of submarine sound a part of the ordinary equipment on every ship.

Now Use Light Beam for Sounding

A Newcastle pilot boat, it is reported from London, has had installed a recent nautical invention in the form of a machine which throws a beam of light to the sea bottom, allowing the depth of water below the ship, to be measured. It is said that sounding the old method may thus be done away with. If this invention proves in practice to be all that is claimed for it, it is of unusual importance, since it may be employed with great advantage by big liners when entering shallow water. According to the report, the searchlight is worked through a hole in the lower part of the ship while an observation glass is placed nearby through which the beam of light may be seen. A mirror is installed at the end of a long observation tube which runs vertically from the bottom of the ship to the bridge. By manipulating a handle, an officer can take angles of the projected beam and by simple calculations determine the depth of water.

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Equipment Used Afloat, Ashore

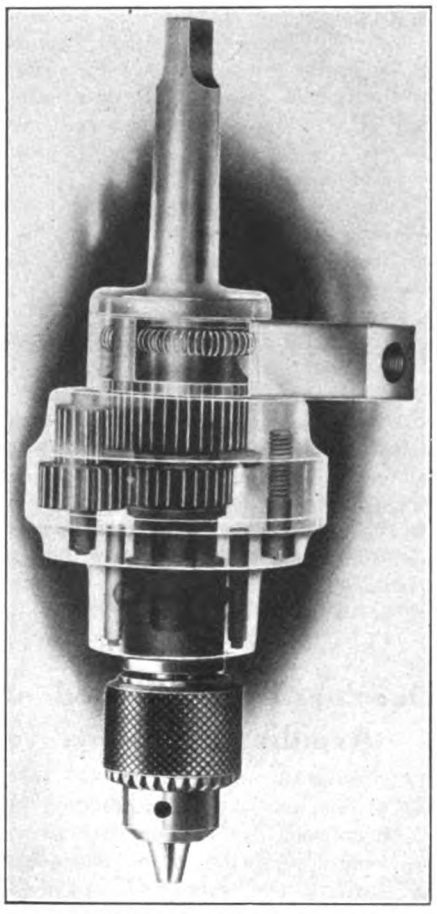
High Speed Tapping Device—Bending Roll of Pyramid Type—Punching Machine—Bilge Pump

Tapping Device Operates at High Speed

Broken taps add an extra expense to manufacturing operations by necessitating frequent renewals and by hindering production. If a tap is broken off in the work, it must be removed or the piece discarded. For the foregoing reasons, special tapping attachments are used in many manufacturing operations.

The tool shown in the accompanying illustration is a tapping attachment developed by the Geometric Tool Co., New Haven, Conn. It embodies an aluminum casing that houses the reverse gears. It is driven by a taper shank that fits the drill press spindle. The device accommodates taps up to ⅜-inch in diameter, being made in two models with positive and friction drives respectively. The positive drive model is especially desirable for tapping holes completely through, while the cone drive is used to advantage in cases where the thread bottoms in a blind hole.

Both models are fitted with a shock absorbing device that takes the strain at the moment of reversal, it being well known that this is a fruitful cause of broken taps.



SENSITIVE HIGH SPEED TAPPER

G. H. Cassell, manager for the last year in Seattle of the department of maintenance and repair of the shipping board, has been transferred to Honolulu where he will have charge of the shipping offices of that district.

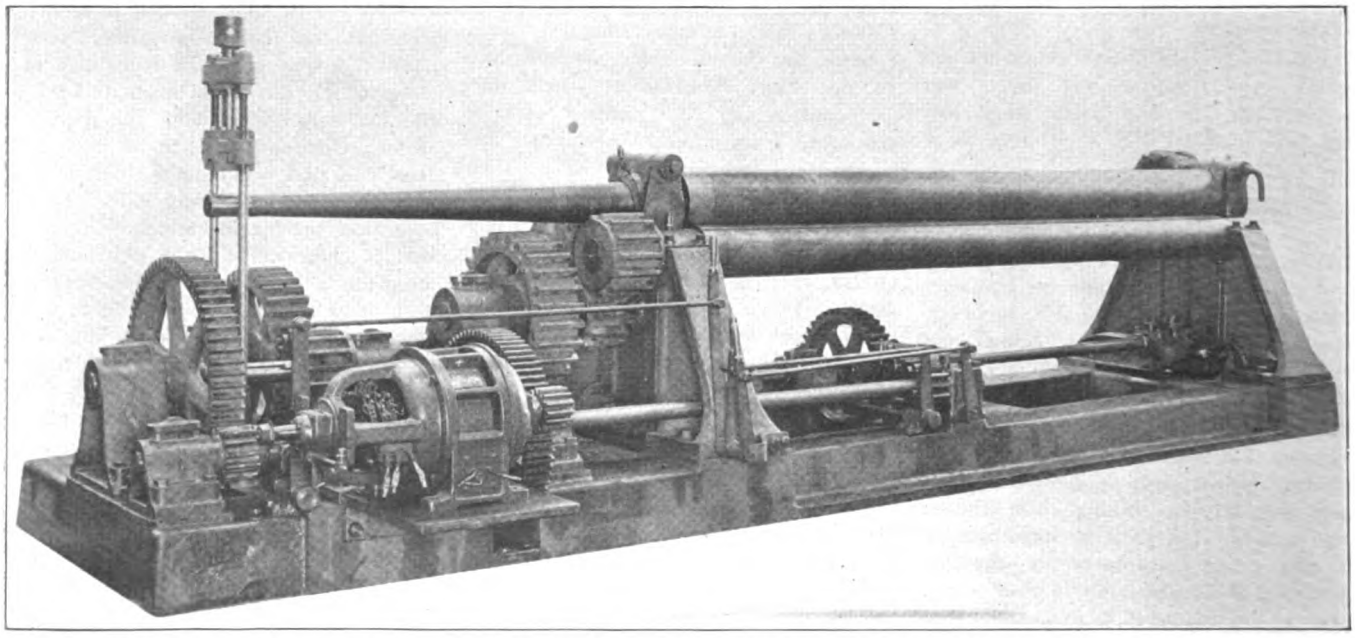
Builds Pyramid Type Bending Roll

A pyramid type bending roll having a 10-foot 2-inch span between housings recently has been introduced by the Cleveland Punch & Shear Works Co, Cleveland. A view of the new machine is shown in the accompanying illustration. This new development is direct-connected, motor-driven and is entirely self contained. The machine is also equipped with a power device for raising and lowering the top roll.

One of the two lower rolls is 8 inches in diameter and has three splines, while the other has two splines and a flanging groove. The upper roll is 11 inches in diameter. The machine is so designed that none of the gears protrude into the foundation.

Two clutches are provided permitting the raising and lowering of either end of the top roll. An additional single clutch is used for starting the rolls. The outer drop hinge can be dropped by lifting the cover plate and dropping the yoke.

T. A. Lee, manager on the Pacific coast for the Furness-Prince line, operating between that coast and United Kingdom ports, has transferred his headquarters from the port of Seattle to San Francisco.



DIRECT-CONNECTED, MOTOR-DRIVEN BENDING ROLL HAVING A POWER LIFT FOR RAISING AND LOWERING TOP ROLL

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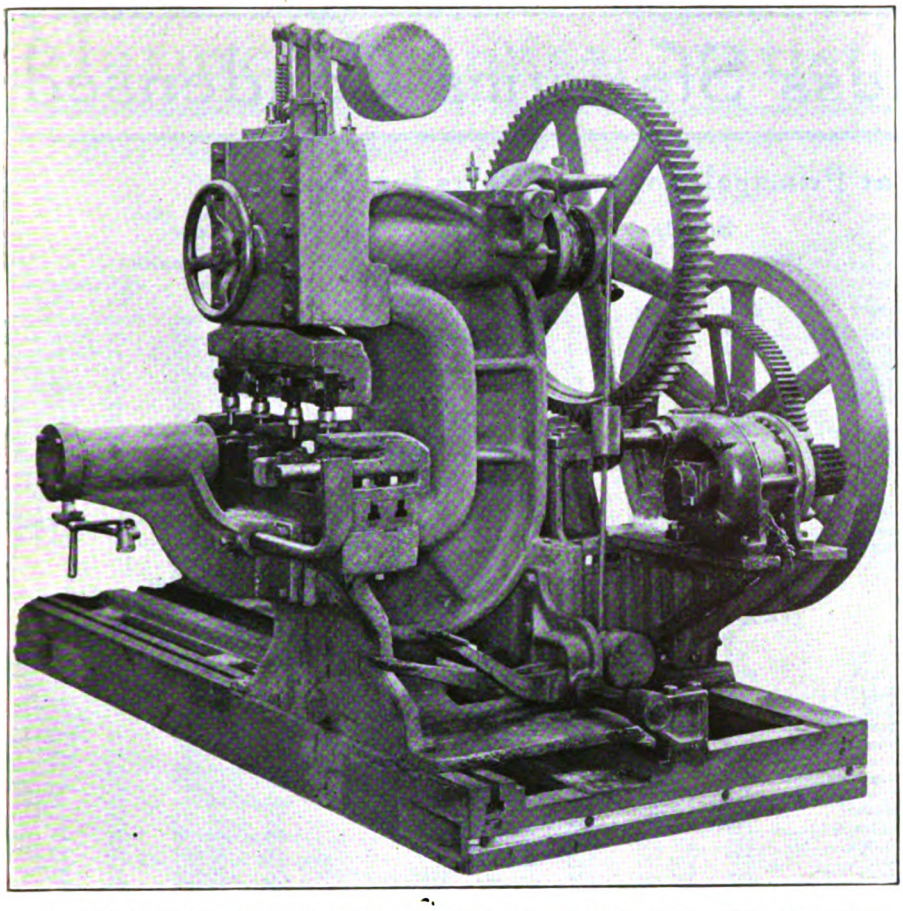


A COMBINATION PUNCH PRESS WHICH HAS ADJUSTABLE ATTACHMENTS

Punching Machine Handles Angular Work

To accommodate work requiring the punching of a number of angles, the Cleveland Punch & Shear Works Co., Cleveland, recently has introduced a punch press which can be operated in multiple. A view of the new press is shown in the above illustration.

Three presses of the type shown when built into a single unit furnishes a desirable combination for use when a number of angles are to be punched. One machine of the set of three is stationary while the other two machines are adjustable by hand. Each air cylinder may be operated individually or all three may be operated simultaneously from the stationary end.

Individually adjusted attachments permit a minimum of 2 inches and a maximum of 20 inches between attachments on each machine. The angles may be punched on either leg without the necessity of turning end for end. Air cylinders are used to hold the angles firmly against the gage block in a straightened condition. Supports are provided for the angles. Gage blocks are adjustable to permit the punching of various gages in the angles front to back. The machine has adjustable punching attachments and adjustable bell mouthed gage blocks and angle supports. When punching the angle with the leg down the angle support automatically disappears.

The steamer S. M. STEPHENSON, which has been in winter quarters at Sheboygan, Wis., has been purchased by Richard Burns of Detroit from the Petoskey Portland Cement Co. She will carry lumber and coal between Detroit and Georgian bay points and will tow the barge JOHN A. FRANCOMB.

Designs New Type of Bilge Pump

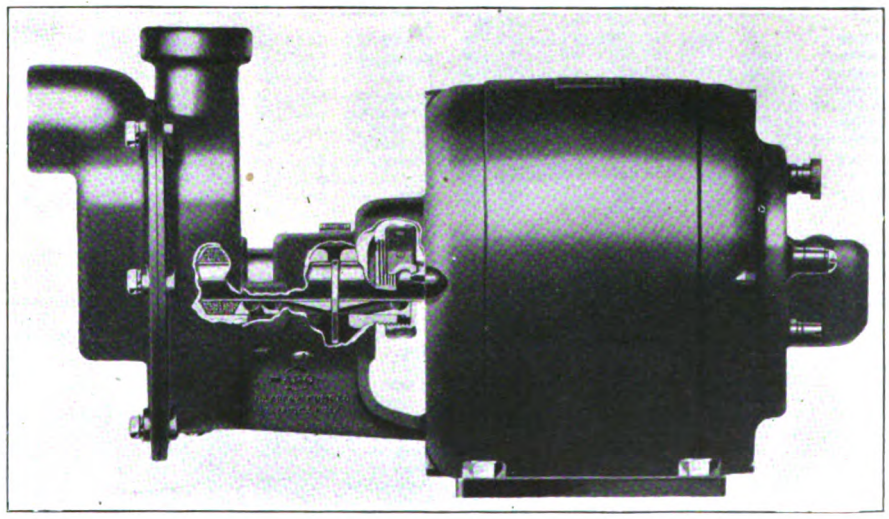
The Arrow Pump Co., Buhl building, Detroit, has incorporated a ring oiled packing gland feature in a motor driven centrifugal pump. While it is an effective unit for general pump service, it is particularly adapted for use as a bilge pump as its construction makes it immune from injurious effects due to the dirty water handled. The bearings are protected from coming in contact with the water and also they are provided with a positive supply of oil by a ring oiler.

The pump has only one working part, the impellor, which will wear indefinitely in ordinary service. A priming chamber enables it to retain its prime and work within its capacity above the level of supply without the use of mechanical prime retainers. The unit requires no base and can be assembled for floor or side wall mounting. As both motor and pump bearings are ring oiled from large oil wells it may be located in isolated places where little or no attention will be had over long periods of time.

In trade through the Panama canal in April, American vessels made up 59 per cent of the total transits, 65 per cent of the total tonnage, and carried 63 per cent of the total cargo.

The New England Foreign Trade convention, held May 17 and 18 was well attended and was instructive. Delegates from all parts of New England and many from points outside attended.

The Augusta Gardiner & Boothbay Steamship Co., Augusta, Me., has bought the property of the Eastern Steamship Co. at that city.



THIS BILGE PUMP IS SELF-CONTAINED AND ELECTRICALLY DRIVEN

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Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	500	1,849,548	501	1,874,019
April	469	1,818,531	467	1,788,555
March	477	1,764,093	494	1,857,212
February	395	1,437,919	413	1,529,096
January	423	1,679,843	439	1,690,010
December, 1922.	397	1,569,778	473	1,819,341
November	426	1,626,068	463	1,805,798
October	452	1,846,327	467	1,848,637
September	519	1,985,981	542	2,104,884
August	515	1,772,837	508	1,865,798
July	509	1,928,541	520	1,977,690
June	486	1,718,879	551	2,070,048
May	524	1,769,601	496	1,759,780

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	105	267,441	82	207,209
April	87	218,177	83	229,333
March	111	306,580	76	209,261
February	67	160,678	54	139,701
January	98	287,240	64	182,402
December, 1922.	78	209,962	63	167,736
November	75	221,130	78	241,326
October	80	205,137	73	202,326
September	103	261,963	74	224,079
August	104	273,123	76	222,478
July	116	307,058	84	248,337
June	103	282,251	83	233,964
May	117	310,117	80	234,220

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	62	188,850	93	286,420
April	21	65,350	73	212,453
March	16	51,333	71	200,858
February	8	24,958	42	130,121
January	14	41,127	44	121,152
December, 1922.	19	52,716	40	137,081
November	6	21,036	38	118,738
October	17	44,423	46	149,670
September	5	22,051	45	132,751
August	15	43,887	51	158,879
July	22	62,986	55	158,254
June	22	73,791	56	175,961
May	21	61,513	73	198,599

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	64	230,778	69	244,321
April	61	199,831	63	227,467
March	50	168,399	71	237,195
February	47	165,333	60	214,686
January	51	156,249	65	216,083
December, 1922.	54	187,648	68	234,385
November	42	154,024	42	154,280
October	59	159,855	69	261,687
September	52	163,697	65	233,079
August	65	221,288	68	219,326
July	64	194,586	55	191,574
June	51	182,219	47	161,761
May	50	170,506	56	191,858

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	156	476,041	160	468,248
April	159	470,698	138	416,969
March	123	375,762	117	354,803
February	80	240,133	94	275,291
January	115	322,661	110	306,393
December, 1922.	110	322,948	104	380,616
November	114	361,162	132	403,593
October	97	289,239	101	304,431
September	107	333,387	112	298,444
August	110	326,163	106	300,080
July	103	320,104	90	280,394
June	99	280,002	118	333,877
May	117	350,494	103	282,285

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	29	133,752	37	159,393
April	32	141,569	31	133,950
March	28	129,070	30	138,428
February	26	120,548	39	156,258
January	27	125,551	36	155,129
(Inclusive of Domestic)				
December, 1922.	201	560,159	198	564,367
November	138	374,871	139	374,871
October	164	417,901	148	406,498
September	159	375,340	159	382,079
August	162	396,363	153	387,908
July	140	373,211	137	371,526
June	139	384,290	137	354,702
May	138	357,583	150	361,835

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	221	550,817	237	603,128
April	234	612,572	237	623,539
March	253	648,990	269	682,080
February	204	559,638	206	539,965
January	242	713,589	233	695,524
December, 1922.	211	543,884	222	573,111
November	220	598,306	219	599,150
October	239	630,306	235	625,605
September	212	555,017	223	571,299
August	249	625,819	250	629,150
July	227	570,709	236	601,740
June	253	596,752	234	587,488
May	236	632,495	230	610,916

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	159	328,183	108	176,845
April	106	328,372	67	197,510
March	106	330,766	51	139,776
February	102	323,880	48	128,949
January	148	429,849	61	160,090
December, 1922.	138	383,366	61	181,975
November	130	357,264	59	123,255
October	149	408,855	91	217,899
September	193	511,027	101	248,328
August	192	449,871	116	203,774
July	159	324,795	94	229,492
June	137	169,015	94	161,888
May	133	251,304	104	192,231

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	74	167,509	74	174,851
April	85	199,871	82	163,074
March	88	203,032	88	206,285
February	83	186,479	72	160,777
January	77	145,151	67	153,001
December, 1922.	66	123,746	56	119,821
November	68	147,775	53	130,769
October	59	143,207	52	110,398
September	66	121,037	51	85,801
August	60	112,431	65	137,552
July	79	152,475	73	138,543
June	77	153,357	76	141,413
May	61	109,793	55	114,691

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	78	246,275	53	179,360
April	87	269,264	72	165,302
March	115	251,459	90	185,155
February	86	148,957	83	137,564
January	91	153,564	92	141,332
December, 1922.	133	132,114	76	83,537
November	110	111,803	111	112,934
October	117	115,548	138	94,522
September	61	127,969	96	133,561
August	52	143,931	43	117,758
July	44	125,139	48	138,275
June	48	109,261	38	90,915
May	47	141,219	55	174,644

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	97	102,033	95	101,422
April	84	85,964	83	88,475
March	91	88,639	90	83,220
February	69	68,735	64	68,658
January	89	81,622	86	79,210
December, 1922.	74	77,623	78	85,839
November	69	71,740	70	71,705
October	61	67,755	64	77,225
September	57	64,645	59	62,676
August	65	69,962	61	65,883
July	67	80,673	67	85,336
June	60	73,308	58	73,842
May	89	107,629	82	101,318

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1923	8	16,470	11	17,781
April	22	75,012	29	100,274
March	29	94,128	31	83,391
February	33	91,190	36	100,312
January	49	144,429	42	126,949
December, 1922.	48	144,019	48	136,247
November	22	45,567	21	46,755
October	27	60,114	22	49,594
September	32	68,125	27	57,609
August	28	42,746	28	47,459
July	19	39,950	20	39,571
June	11	16,601	15	21,765
May	16	21,380	10	22,477

Savannah

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net Tonnage
April, 1923	26	81,582	27	83,365
March	31	95,905	30	89,323
February	31	87,315	31	87,703
January	28	93,564	28	93,587
December, 1922	22	66,619	17	57,279
November	14	41,665	15	40,606
October	19	52,065	19	46,054
September	26	68,878	26	73,540
August	22	63,662	22	59,974
July	23	66,833	23	61,655
June	11	24,870	20	53,367
May	11	20,536	16	40,181
April	8	20,485	15	42,591

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net tonnage
May, 1923	78	181,759	97	256,745
April	65	162,317	77	209,388
March	58	170,841	97	287,278
February	48	146,944	76	233,591
January	69	219,967	89	282,889
December, 1922.	64	214,952	79	260,159
November	56	174,964	87	304,352
October	59	156,587	85	260,702
September	48	144,403	56	187,724
August	59	180,814	63	203,194
July	52	165,276	50	186,291
June	61	193,016	61	200,957
May	60	196,575	59	200,787

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net Tonnage
May, 1923	16	58,889	21	72,663
(Inclusive of Domestic)				
April	107	261,426	105	259,503
March	109	320,448	129	320,035
February	100	264,371	99	257,402
January	95	265,440	101	286,806
December, 1922.	98	266,774	107	291,126
November	98	266,706	105	283,881
October	109	290,048	109	267,006
September	111	313,168	108	298,452
August	102	256,671	103	259,170
July	95	254,553	88	233,744
June	104	300,517	110	319,637
May	85	226,853	88	230,176

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Marine Business Statistics Condensed

Port Traffic Record

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April	47	72,722	55	119,521
March	54	69,428	51	135,906
February	49	50,379	48	167,872
January	49	36,744	52	146,532
December, 1922	58	70,948	53	195,322
November	65	72,192	63	215,043
October	55	57,106	53	168,254
September	43	46,600	43	97,005
August	35	40,503	32	63,281
July	29	30,909	32	73,299
June	38	48,938	36	74,798
May	44	45,108	42	134,046
April	42	61,751	47	98,825

Port Arthur, Tex.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1923	58	191,158	56	188,376
March	64	188,176	55	169,005
February	52	172,273	44	142,554
December, 1922	59	210,778	65	218,274
November	42	143,551	47	154,010
October	68	227,039	66	217,502
September	53	158,181	57	168,681
August	69	227,941	70	224,654
July	88	296,956	82	270,263
June	81	271,752	87	285,633
May	90	303,623	88	292,595
April	90	282,288	101	313,829

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1923	10	33,783	12	41,352
March	8	31,910	8	34,367
February	17	56,353	10	39,840
January	13	45,175	12	52,651
December, 1922	6	23,609	8	29,871
November	11	47,565	10	31,470
October	9	31,293	9	31,232
September	30	84,037	13	40,223
August	18	61,741	11	38,649
July	10	19,279	7	22,228
June	10	31,095	7	17,423
May	14	49,985	13	37,000
April	9	24,854	7	31,049

Commerce Through Soo Canal in May

Despite the handicaps imposed by ice blockades during the early part of the month, the May record of freight handled through the Soo canal was satisfactory. The total was 10,645,275 net tons, about 760,000 tons below the mark set in May, 1918 but greater than in any other year since 1917. As shown by the following table, the May total was more than three times as large as in May of last year:

	Net tons
May, 1923	10,645,275
May, 1922	3,316,645
May, 1921	6,155,063
May, 1920	8,421,210
May, 1919	10,566,326
May, 1918	11,404,045
May, 1917	8,807,892

Of the total movement in May, iron ore accounted for 6,081,285 net tons and coal for 2,863,817 net tons. Eastbound freight movement was 70 per cent of the total. The American locks handled 10,351,180 net tons and the Canadian lock 294,095 net tons. Distribution of the Soo traffic both east and west bound and by commodities follows:

	To June 1, net tons
EASTBOUND	
Lumber, M. ft. B. M.	8,582
Flour, barrels	1,042,240
Wheat, bushels	37,054,821
Grain, bushels	9,790,541
Copper, net tons	8,250
Iron ore, net tons	6,081,285
Pig iron, net tons	
Stone, net tons	450
General merchandise, net tons	2,908
Passengers, number	422
WESTBOUND	
Coal, soft, net tons	2,622,357
Coal, hard, net tons	241,460
Iron ore, net tons	12,779
Manufactures of iron and steel, net tons	11,912
Salt, net tons	12,682
Oil, net tons	10,414
Stone, net tons	107,516
General merchandise, net tons	82,558
Passengers, number	365
SUMMARY	
Vessel passages, number	2,390
Registered tonnage, net	7,927,523
Freight:	
Eastbound, net tons	7,543,597
Westbound, net tons	3,101,678
Total freight, net tons	10,645,275

Lake Erie Receipts

Out of shipments of iron ore from upper lake ports of 6,671,705 gross tons in May, Lake Erie docks received 4,279,320 tons. The distribution by ports follows:

Port	Gross tons
Buffalo and Port Colborne	606,342
Erie	119,116
Conneaut	791,671
Ashtabula	1,090,588
Fairport	217,963
Cleveland	852,824
Lorain	312,153
Huron	98,952
Toledo	181,522
Detroit	8,189
Total	4,279,320

The Inter-Colonial Navigation Co. has succeeded to the business of the Tri-National Steamship Corp., and will operate the service between Boston, Halifax and St. Johns. The steamer ADVANCE is expected to open the service from Boston.

Record of Traffic Through Panama Canal

		Atlantic to Pacific traffic —Panama Canal— No. of ships	Net tonnage	Tons of cargo	Pacific to Atlantic traffic —Panama Canal— No. of ships	Net tonnage	Tons of cargo	Total traffic through canal —Panama Canal— No. of ships	Net tonnage	Tons of cargo
1923 April	American	123	662,300	331,114	116	637,178	1,041,481	239	1,299,478	1,372,595
	Foreign	81	360,318	322,255	84	347,894	492,295	165	708,212	814,550
	Totals	204	1,022,618	653,369	200	985,072	1,533,776	404	2,007,690	2,187,145
March	American	119	635,992	348,598	96	509,443	819,204	215	1,145,435	1,167,802
	Foreign	114	505,290	329,890	80	337,467	443,236	194	842,757	773,126
	Totals	233	1,141,282	678,488	176	846,910	1,262,440	409	1,988,192	1,940,928
February	American	97	486,186	325,835	82	422,871	633,458	179	908,673	959,293
	Foreign	78	354,190	237,604	69	266,300	366,381	147	620,874	603,985
	Total	175	840,376	563,439	151	689,171	999,839	326	1,529,547	1,563,276
January	American	88	450,254	313,094	67	320,300	462,245	155	770,554	775,339
	Foreign	106	473,524	285,649	91	366,614	530,944	197	840,138	816,593
	Total	194	923,778	598,743	158	686,914	993,189	352	1,610,692	1,591,932
December-	American	78	363,857	328,924	68	344,847	551,907	146	710,704	880,831
	Foreign	83	352,020	231,494	75	312,539	422,777	158	664,559	654,271
	Total	161	717,877	560,418	143	657,386	974,684	304	1,375,263	1,535,102
November	American	65	324,783	234,500	55	273,293	416,515	120	598,076	651,015
	Foreign	83	370,180	266,878	91	369,024	508,967	174	739,204	775,845
	Total	148	694,963	501,378	146	642,317	925,482	294	1,337,280	1,426,860
October	American	70	328,229	264,171	51	250,606	385,196	121	578,835	649,367
	Foreign	89	384,223	300,904	84	347,334	495,592	173	731,557	796,496
	Total	159	712,452	565,075	135	597,940	880,788	294	1,310,392	1,445,863
September	American	54	260,249	226,741	53	235,008	315,898	107	495,257	542,639
	Foreign	72	322,167	241,095	61	252,986	354,454	133	575,153	595,549
	Total	126	582,416	467,836	114	487,994	670,352	240	1,070,410	1,138,188
August	American	58	261,613	257,674	48	236,669	305,838	106	498,282	563,512
	Foreign	83	350,249	299,087	68	235,602	303,351	151	585,851	602,438
	Total	141	611,862	556,761	116	472,271	609,189	257	1,084,133	1,165,950
July	American	52	250,378	246,471	55	272,868	335,154	107	523,246	581,625
	Foreign	76	323,853	295,941	68	280,772	333,534	144	604,625	629,475
	Total	128	574,231	542,412	123	553,640	668,688	251	1,127,871	1,211,100
June	American	57	256,060	269,093	45	205,063	211,373	102	461,123	480,466
	Foreign	78	338,136	317,284	48	171,454	179,728	126	509,590	497,012
	Total	135	594,196	586,377	93	376,517	391,101	228	970,713	977,478
		Vessels in Ballast								
1923 April	American	67	393,895	0	3	18,837	0	70	412,735	0
	Foreign	11	44,214	0	2	9,412	0	13	53,626	0
	Totals	78	438,109	0	5	28,249	0	83	466,358	0
March	American	60	359,006	0	4	7,841	0	64	366,847	0
	Foreign	35	144,223	0	3	9,915	0	38	154,138	0
	Totals	95	503,229	0	7	17,756	0	102	520,985	0
February	American	36	229,578	0	0	0	0	36	229,578	0
	Foreign	24	105,848	0	3	7,486	0	27	113,334	0
	Total	60	335,426	0	3	7,486	0	63	342,912	0
January	American	29	181,617	0	2	10,141	0	31	191,758	0
	Foreign	26	109,586	0	1	4,942	0	27	114,528	0
	Total	55	291,203	0	3	15,083	0	58	306,286	0

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Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Vessel	Date	Nature	Place	Damage Resulting
Alpena	May 16	Grounded	below Walkerville	Jettis. cargo
Ann Arbor No. 4	Feb.	Sunk, raised May 22	Frankfort harbor	Badly damaged
Athol	Apr. 27	Heavy ice	Cape Breton Coast	Bow bent
Ashbay	May 10	Disabled	Queenstown	Pumps and pipes dis.
Ada Tower	May 18	Ashore	Patchogue	Floated
Alfored Nobei	May 14	Dis. by ice	North Sydney	Prop. broke and plates bent
Azov	May 14	Ashore	Courtney Bay	Undamaged
Alada	May 20	Fire	New York	May be total loss
Argo	May 26	Col. with ice	Soo	Hole in planking
Albany	June 4	Grounded	Bay Ridge, N. Y.	Floated
Alex B. Uhrig	June 3	Ashore	nr. Bailey harbor	29 plates damaged
Ball Bros.	May 16	Grounded	Sandusky	Leaked slightly
Bird	May 14	Collision	Buffalo river	Damaged
Brookton	May 17	Ice	Upper Soo river	Grounded
Brighton	May 18	Ashore	near Frontera	Not stated
Blackheath	May	Ice	off Cape Breton	To stern, plates and beam
Bibbco	May 26	Ashore	Santa Fe	Floated
Baron Vernon	May 26	Collision	River Clyde	Heavy
Bourbonnais	June 6	Fire	Genoa	In bunkers
Back Bay		Struck bottom	Beaver Island	To bottom
Brookdale	June 5	Collision	Montreal	Sunk, total loss
Cletus Schneider	May 12	In ice	above Whitefish Pt.	Not stated
Chippewa	May 20	Grounded	Middle Bass	Undamaged
Charles W. Warner	May 20	Grounded	Long Island	Undamaged
Conneaut	May 22	Disabled	Detroit	Lost shoe and rudder
Cape Race	Apr. 30	Struck iceberg	at sea	Hull dam.
Ceylon Maru	May 13	Disabled	Baltimore	Machy. disabled
City of Austin	May 16	Fire	Norfolk	Damaged
Comet	May 16	Collision	New York	Unknown
Commercial Guide	May 19	Disabled	nr. San Pedro	Boil. trouble
Cody	May 17	Disabled	Fayal	Eng. trouble
Canadian Adventurer	May 24	Grounded	Lake St. Clair	Jettis. cargo
Cedarhurst	May 24	Not under control	New York	Not stated
Cornish City	May 24	Fire	off Staten Island	To cargo and hold
Challamba	May 21	Disabled	San Francisco	Eng. trouble
Coquelle	May 22	Abandoned	nr. Bridgeport	Drifted ashore
Dungeness	May 21	Fire	Staten Island	Slight
Deroche	May 22	Fire	off Point Fermin	Not stated
E. U. Demmer	May 20	Collision	Lake Huron	Sunk
Edward L. Doheny, Jr.	May 2	Disabled	S. of Cape San Antone	Broke shaft lost prop.
El Chico	May 24	Collision	North River	Not stated
Emory L. Ford	May 31	Struck lost anchor	W. Neebish rock	Not stated
Eugenia Hooper	May 31	Leaking	Delaware	Water in hold
Ephrata	May	Ashore	Kenebec River	Under water
Essex	June 5	Not stated	off Beach Haven	Foundered
Frank C. Ball	May 12	In ice	above Whitefish Pt.	Not stated
Fred Baxter	May 14	Disabled	off Port Oxford	Lost prop.
Frank Jenkins	May 30	Sank	off Little Hell Gate	Not stated
Grand Island	May 14	Struck crib	W. Neebish	5 plates damaged
George Parker	May 13	Collision	Detroit river	Sunk
Glenmurrie	May 21	Ashore	Bay St. George	Not stated
George L. Olson	May 26	Lost rudder	Grays Harbor	In tow
Glen Beulah	June 2	Collision	SE of Cape Charles	Sunk
H. P. McIntosh	May 21	In ice	above Whitefish Pt.	Not stated
Hampton Roads	May 11	Steerer deranged	Mobile	Col., slight
Huanchaco	May 18	Gale	Straits of Magellan	Lost rudder
H. S. Wilkinson	June 5	Collision	Point Iroquois	Damaged
J. T. Hutchinson	May 14	Ashore	Georgian Bay	42 plates damaged
J. H. Sheadle	May 14	Collision	Lake Erie	Plates damaged
J. F. Morrow	May 16	Ashore	near Cave Island	Jettis. cargo
Jamieson	May 16	Foundered	Lake Ontario	Total loss
James Davidson	May 13	Collision	Detroit river	Undamaged
Javary	May 15	Collision	off Hell Gate	Hole in forepeak
Jan	May 16	Ashore	Northumberland Straits	Leak, badly
Juan	May 16	Disabled	Baltimore	Machy. disabled
Jolee	June 1	Disabled	Savannah	Condenser tubes dis.
Knockfierna	May 24	Ashore	Point Pius, P E I	Undamaged
Keybell	June 5	Struck	Welland canal	Bottom damaged
La Provence	May 11	Disabled	St. Pierre	In tow
Lake Fairport	May 14	Stranded	Port au Prince	Jettis. cargo undamaged
La Savoie	May 14	Struck dock	Havre	Bows damaged
Ligonier	May 13	Grounded	Chester Island	Jettis. cargo
London Corporation	May 15	Lost chain and anchor	Marcus Hook	Not stated
Lake Gebhart	May 17	Ashore, drifted	nr. Umatilla Reef	Foundered
Leviathan	May 26	Fire	Boston	Slight
Lincoln	May 28	Turned over	Bass River	Strained
M. A. Bradley	May 14	Collision	Buffalo river	Not stated
Marcia	May 15	Grounded	Livingstone channel	Undamaged
Malmen	May 10	Collision	off Cape Henry	Unknown
Maryland	May 10	Collision	off Cape Henry	Slight
Montlaurier	May 11	Disabled	Belfast	Boil. trouble
Marine Co. derrick	May 9	Not stated	New York	Sunk
Mary J. Kennedy	May 15	Not stated	New York	Sunk
Madison	May 14	Grounded	New York	Not stated
Manhattan Island	May 17	Ashore	near Chanak	Floated
Marcella	May 18	Caught in ice	off Cape Breton	Sunk
Marvale	May 21	Struck rock	Newfoundland coast	Sunk, breaking up
Maquin	May 20	Disabled	Savannah	Turbine gears dis.
Maggie Marshall	May 18	Struck	Cape Hogan	Believed a total loss
Metagama	May 26	Collision	River Clyde	Slight to bow
Mapledawn	June 5	Collision	Montreal	Not stated
Maplebranch	May 25	Struck bottom	below Kingston	Beached
Nishaha	May 15	In tow	Hamburg	Rudder dis
Noccalula	May 12	Disabled	at sea	Turbine dis.
New Georgia	May 17	Grounded	Erie Basin	Not stated
Nonpariel	May 24	Collision	North River	Entire side stove in
Norfolk	May 31	Ashore	Cross Rip	Not stated
Nellie Eaton	May 29	Leaking	New York	Leaky seams
Oxonian	May 19	Struck obst.	off Cape Race	Hole in bow
Pere Marquette No. 4	May 15	Collision	Milwaukee	Const'l total loss
Pere Marquette No. 17	May 15	Collision	Milwaukee	Not stated
Petcol	May 21	Shifted	Cleveland	Damaged shaft
Parthia	May 12	Hard passage	Halifax	Leak., stem damaged
Pluto	May 17	Disabled	St. John, NB	Holds and Eng. room leak and prop. dis.
Presidente Alessandri	May 20	In distress	off Taltal	Not stated
Panther Creek	June 4	Struck bridge	Cape Cod Canal	Ashore
Panay	May	Struck	Byng Inlet	Plates damaged
Robert Fulton	May 15	Grounded	Livingstone channel	Undamaged
R. J. Paisley	May 17	Ice	Upper Soo river	Grounded
Recca	May 11	Disabled	Halifax	Boil. trouble
Rapallo	May 26	Grounded	nr. Poveglia	Floated
Rosalie Mahony	June 2	Capsized	nr. Williamette River	Not stated
Rapid Prince	June 5	Struck	St. Lawrence river	Damaged
Smith Thompson	May	Ashore	Squaw Island Reef	Damaged
S. W. Hart	May 21	Gale, hit pier	Duluth	To plates, leak.
Saturn	May 20	Collision	Lake Huron	Heavy
Senator	May 11	Collision	Mobile	Slight
Sudbury	May 11	Grounded	off Southwest Pass	Floated
Santa Malta	May 15	Fog	off Cape Henry	Grounded
Spencer Lake	May 18	Lost rudder	Woods Island	Grounded
Standard Arrow	May 19	Grounded	near Hankow	Floated
Sarah Eaton	May 27	Disabled	Portland	Leaking
Truesdale	May 13	Ashore	Gull Island	Jettis. cargo
Tyrone	May 15	Hit pier	Duluth	To plates, leak.
Trompenborg	May 23	Turned turtle	Miramichi	Not stated

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Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties—
A Record of Collisions, Wrecks, Fires and Losses

Vessel	Date	Nature	Place	Damage Resulting
Ursula	May 14	Collision	Buffalo river	Sunk
Vredenburg	May 19	Ashore	near Maassluis	Floated
Virginia Dare	June 2	Stuck in mud	West Bank	Floated
Vigilant	May 29	Gale, struck obj.	off Ventura	Leak, badly
W. H. Truesdale	May 14	Collision	Lake Erie	Plates damaged
Winnebago	May 12	Grounded	off Sparrows Point	Not stated
Western Spirit	May 18	Fire	Mid-Atlantic	Not stated
West Isleta	May 18	Grounded	St. John	Slight to stern and leak.
W. J. Roberts	May 31	Lost anchor	W. Neebish rock	Not stated
Wm. A. McKenney	June 3	Fire	San Pedro	In bunkers
West Nohno	June 7	Disabled	Las Palmas	Eng. dis. and boil. leak.
W. A. Sherman	May 30	Struck dock, sank	Brockville	Floated
W. B. Schiller	June 5	Collision	Point Iroquois	Grounded

Iron Ore Shipments

Shipments of iron ore in May from upper lake ports were 6,671,705 gross tons, an increase of more than 5,000,000 tons over the corresponding month last year. While April shipments this year were negligible, the total movement to June 1 is also nearly 5,000,000 tons ahead of last year's total. Shipments by ports follow:

Port	May, 1923	To June 1, 1923
Escanaba	929,960	944,144
Marquette	288,668	288,668
Ashland	747,104	747,104
Superior	1,793,025	1,793,025
Duluth	2,027,300	2,027,300
Two Harbors	885,648	885,648
Total	6,671,705	6,685,889
1923 increase	5,086,400	4,964,423

Lake Michigan Receipts

Lake Michigan ports in May received 1,183,990 gross tons of iron ore as shown in the following distribution by ports:

Port	Gross tons
South Chicago	697,613
East Jordan, Mich.	8,811
Boyne City, Mich.	.....
Milwaukee	.....
Indiana Harbor, Ind.	104,845
Gary, Ind.	372,721
Total	1,183,990

Montreal Takes Trade from Boston

The port of Boston has settled down to its regular summer trade after the usual spring loss of traffic to the port of Montreal. C. H. Sprague & Co. have transferred their Scandinavian service from Boston to Montreal for the summer and practically the entire movement of wheat through Boston has been transferred to the northern coast.

Despite these setbacks, Boston shippers are cheerful over the prospect. International trade is on the increase and Boston is feeling the effects of this along with other eastern ports. The direct service between eastern South America and Boston has maintained regular sailings ever since the first of the year and now reports an improvement in cargo offerings. The service to the Mediterranean has also held up well and it is interesting to note that as the Egyptian cotton season has neared completion, the consequent loss in freight has been more than made up by shipments of Egyptian onions.

The coast to coast trade continues heavy despite the strike situation at the ports of California. Coastwise trade out of Boston also shows signs of improvement. Approximately 200,000 tons of coal arrives each week at Boston from Hampton Roads and other Atlantic ports. The Burton Steamship Co. has opened a new freight service between Boston and Philadelphia. The summer service between Boston, Halifax and St. Johns has again started although this year it is operated by the Intercolonial Navigation Co. instead of the Tri-National Steamship Corp. as formerly.

Pittsburgh River Traffic

In May, the traffic on the rivers in the Pittsburgh district aggregated 2,700,721 net tons of which coal contributed 1,992,380 tons. Sand and gravel followed in order while steel shipments were 47,110 tons. The distribution is as follows:

PITTSBURGH RIVER COMMERCE IN MAY

Commodity	Allegheny river short tons	Monongahela river short tons	Ohio river short tons	Total short tons
Coal	133,455	1,496,540	362,385	1,992,380
Coke	0	31,431	0	31,431
Gasoline	1,400	1,040	450	2,890
Gravel	78,455	89,021	88,645	256,121
Packet cargo	0	0	6,617	6,617
Sand	112,650	123,433	104,727	340,810
Steel products	0	25,910	21,200	47,110
Unclassified.	315	5,422	17,625	23,362
Total	326,275	1,772,797	601,649	2,700,721

Will Resume New York London Service

Planning to resume its direct passenger service between New York and London with new ships, the Atlantic Transport line has recently announced that the first ship will be the MINNEWASKA commissioned in August. A prominent part was played by the Atlantic Transport line in the passenger trade during the 10 years preceding the war. Its ships were the MINNETONKA, MINNEAPOLIS and MINNEHAHA.

The new MINNEWASKA of 21,000 tons was launched on March 24 at the Harland & Wolff yards, Belfast, Ireland, and is scheduled to make her maiden voyage to New York on Aug. 4. This vessel will be the model for the three others. The MINNEWASKA is 626 feet long and 80 feet in breadth. The ships will berth at pier 58, North River, in New York, and at George V. docks, London.

These new "Minne" boats, carrying first cabin bookings only, will be limited to 369 passengers each. The passenger quarters are above the upper deck and located amidship. One deck will be devoted exclusively to public rooms, of which oak panelings and white walls are the motif. The lounge located forward will be finished in American sycamore, paneled in mid-seventeenth century style. Mahogany furniture will predominate. The reading room amidship will be finished in lustreless white and the smoking room will be paneled in cedar walls and walnut furniture will be used. Radio telephones will be fitted on these ships.

The Gendall Equipment Corp. of Massachusetts, Worcester, Mass., appliances for marine and land equipment, has been incorporated for $100,000 by John S. Gendall, Woodmont, Conn., Clarence F. Wood, Worcester, and John G. Wragg, New London, Conn.

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Georgian Bay Yard Builds Canal Size Freighter

The Collingwood Shipbuilding Co., Ltd., has completed at its plant in Collingwood, Ont., the single screw steamer DALRYMPLE, built to its own order. The vessel is a canal size freighter and is built under the classification and supervision of the British Corp. for the survey and registry of shipping. The principal dimensions are: Length between perpendiculars, 252 feet; length overall, 259 feet, 12 inches; beam, 43 feet; molded depth, 19 feet. She will carry 90,000 bushels of wheat on a draft of 14 feet. The vessel is fitted with a triple expansion engine, with cylinders 15½, 26 and 44 inches by 26-inch stroke.

Steam is supplied by one Scotch marine boiler 14 feet in diameter and 10 feet 9 inches long, working under forced draft. The vessel has three large holds and seven hatches. The captain's and officers' accommodation is tastefully decorated in oak and is situated in the fore end of the ship while the chief engineer, engine room staff and firemen are housed in the deckhouse aft. In this deckhouse are also situated the dining saloon, galley, pantry, etc. The vessel was launched with steam up ready for sea.

New Lake Liners Set High Standard

TWO new steamers for the Detroit & Cleveland Navigation Co.'s express service, Detroit and Buffalo division, are being built by the American Shipbuilding Co., Cleveland. Hull and boilers are being constructed at the Lorain, O., yard; engines and finishing will be carried out at the Detroit yard.

These steamers will be the largest of their type and the most commodious in the world, having 625 staterooms for passengers, and accommodations for 300 officers and crew. Their dimensions and special features are as follows: Length, 535 feet; breadth of hull, 58 feet; breadth overall, 98 feet 6 inches; load draft of water, 15 feet; cargo capacity, 1000 tons; speed 21 miles per hour.

The hull, including topside, main and orlop decks and all deckhouses, are constructed of steel. The double bottom is divided into 16 watertight divisions. The hold is divided into 11 compartments by watertight bulkheads. All of the stack, engine and galley casings and vents are of steel and extend well above the upper deck cabins. The cruiser stern and balance rudder is adopted. Two independent duplicate steering engines are arranged to be operated alternately from the pilot house. Bow rudder with steam gear is provided. Stockless anchors, two at the bow and one at the stern fitted with the highest quality, weldless cast steel chain cables will be carried. Steam mooring engines with steel wire cables are to be installed.

There is provided two electric service elevators, refrigerating plant, five electric ventilating air washing and cooling machines with ducts extending throughout the hull. Smoking room for crew is on a deck forward. Electric lighting plant consists of three 100 kilowatt turbogenerators with about 5000 lamps and 100 horsepower of motors.

The passenger entrance and lobby is on *A* deck and extends across the whole breadth. It is finished in mahogany, Spanish style with deck of rubber tile. About the lobby is conveniently arranged the purser's and steward's offices, telephone, check and baggage rooms.

Immediately aft is the main dining room in Colonial style, white and mahogany finish. At the forward side of the lobby is the vestibule and stairway leading up to the great central saloon. The Italian rennaissance style prevails there. The paneling on the *B* deck is of walnut and mahogany. *C* and *D* decks are painted French gray enamel with ceiling modeled in low relief and painted in brilliant colors. The gallery balustrades are iron. A rolling screen is fitted for showing photo pictures. The after part of *D* deck is the palm room with ceiling decorated in color.

The smoking room is located on *D* deck at the extreme after end and is finished with chestnut in the Danish style. Luncheon room of large size with modern equipment is located on *A* deck, starboard side, immediately forward of the lobby.

Sleeping accommodations for passengers are provided on three decks, comprising 625 rooms, each room having one or two berths, all with pressure water service, electric lights and telephone. All inside rooms have windows and special ventilation with washed and cooled air, and vents to outside air. All parlor rooms are arranged with twin beds, couch, combination dresser and writing table and private bathroom; those on *C* deck have a private balcony. The structural and decorative features of the parlors are in the Adam, Colonial and French style. The interior design and decoration is by W. & J. Sloane, New York.

The propelling machinery consists of a 3-cylinder compound engine of 10,000 horsepower. Diameter of high pressure cylinder is 66 inches. Diameter of low pressure cylinders is 96 inches. The stroke of the pistons is 9 feet. Feathering paddle wheels, 30 feet in diameter are used with 11 paddles, 14 feet 10 inches long, by 5 feet wide.

The boilers are of the fire tube type, with six single ended, 14 feet in diameter, 10 feet 6 inches long and three double ended, 14 feet in diameter and 20 feet 6 inches long. Twenty-four furnaces, 54 inches in diameter are installed The tubes are 2¼ inches in diameter. Steam pressure is 167 pounds. All boilers are fitted with Foster superheaters and the Howden hot draft system. Complete equipment of auxiliary machinery of the highest class is carried. The steamers are built under the rules and survey of the American Bureau of Shipping for the highest class for lake service. The joiner work was designed by Arthur C. Kiel, Detroit.

Will Study Government Operation of Ships

The United States shipping board at a meeting on June 4 adopted the following resolution: *Resolved*, that a committee, consisting of the chairman of the shipping board, the vice chairman and Commissioner Frederick I. Thompson, prepare a plan to be submitted to the shipping board with a view to the formation of such companies or organizations, to be owned and controlled by the shipping board, as it may ascertain to be necessary for the purpose of operating sufficient vessels to fully cover world trade routes under the American flag consonant with the greatest possible economy and efficiency in direct government operation."

Chairman Lasker, who retired on June 19 from the board, was to be followed on the committee by incoming Chairman Farley. During the period of the study and until the plan evolved therefrom has been adopted by the board, operations will proceed through managing agents as at present.

Commissioner Lissner reported to the board the results of the negotiations had in New York by the committee consisting of himself and Vice Chairman O'Connor in connection with bids for routes not now operated by the government. But three or four promising bids remain.

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Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

IT APPEARED in the case of YAYE MARU, 274 *Federal Reporter* 195, that the charter party required the owner of the vessel involved to keep the same "in a thoroughly efficient state in hull, machinery and equipment for and during the service," and provided that, in the event of loss of time from breakdown or "any other cause preventing the full working of the vessel, the payment of hire shall cease for the time thereby lost." After entering on the charter and while lying in port awaiting cargo,the vessel was injured in collision and rendered unseaworthy as to one hold for loading or carrying cargo, and she was taken by the owner and repaired. The charterer continued to keep the vessel waiting for a considerable time after completion of the repairs, and the question arose as to whether the charterer was entitled to off-hire until the repairs were completed. In deciding the issue in the affirmative, the court said: "The 'loss of time' provided for in the charter party means the time during which the vessel was not in 'full working' order as the result of an injury, and for that time the charterer was released from the payment of hire, although he would have made no use of her if she had not been disabled. It can not be that he was bound to pay for a vessel he could not use, merely because he deemed it for his interest to keep her out of use. His right to off-hire did not depend upon loss of profits, but upon the fact that the vessel was not in a 'thoroughly efficient' condition. Besides, as already mentioned, on notice of the accident and claim of off-hire, the owner took such possession of the vessel as was needful for making repairs, and that possession necessarily deprived the charterer of any use of her which otherwise he might have made. In that situation, and while it existed, the owner's right to compensation was suspended by the terms of the contract."

* * *

A fishing schooner operated on a lay and whose master had no authority to bind her is subject to a lien for supplies of food delivered on board upon order of the master in a port where she was not known, where it did not appear that it was customary to operate fishing boats on the lay on that part of the Atlantic coast, and the libelant relied on the apparent authority of the master.—ANGIE B. WATSON, 274 *Federal Reporter* 218.

* * *

An amount agreed upon at a survey ($700) as the cost of restoration of a damaged vessel will not be allowed where such vessel was old and was actually repaired later, in another way, for a much less sum ($220), and then used for a long period of time. The court thus decided in the case of DOWNER, 274 *Federal Reporter* 220, holding that the survey was not necessarily conclusive. The commissioner found, said the court, "the survey was not shown to be incorrect in any particular, and that it does not appear that the repairs made the vessel precisely as strong, staunch, and serviceable as she was before the accident. This must be done." The case was controlled by the principles stated in the case of J. T. EATON, 24 *Federal Reporter* 95.

* * *

If without fault on the part of the tow a misfortune occurs under circumstances in which, if proper care is exercised in performing a similar service, such misfortune does not ordinarily occur, it suffices to impose upon the tug the burden of proving that due care was exercised.—Kiernan v. Lake Champlain Transportation Co., 273 *Federal Reporter* 499.

* * *

Provision of a charter which exempts delays from strikes connected with the working, delivery, or shipment of the cargo does not exempt the charterer from delays caused by strikes in the mills manufacturing the lumber for the cargo. "Construction in accordance with the general rule," it was held in the case of W. R. Grace & Co. v. Hansen, 273 *Federal Reporter* 486, "would be that, when the charterer makes a contract for the use of a ship, the presumption is that he has a cargo in existence in relation to which the contract is made. It is not a part of the contract that the provision shall pertain to procurement of the cargo."

* * *

The purpose of the act of congress of June 29, 1888, Chapter 496, Section 1, prohibiting the dumping of refuse, ashes, mud, dregings, sludge, acid or any other matter of any kind in the harbor of New York or its adjacent or tributary waters said the court in the case of Warner-Quinlan Co. v. United States, 273 *Federal Reporter* 503, is to prevent discharge or depositing matter into the harbor which obstruct or injure it. Deposits which do not obstruct or injuriously affect the harbor are not prohibited by the act. Obstruction is the principal injury congress had in mind, but it is not the only one; for "acid" would not obstruct, but would corrode and be detrimental to boats, wharves, etc., and would thus be injurious to the harbor as such, as owners and captains of boats would not care to enter harbors whose waters contained acids which were injurious to boats. It was held in that case that fuel matter, sludge, black oil, and oil and tar, discharged into the harbor from an asphalt plant, came within the terms of the statute, and conviction therefor was upheld.

* * *

A stevedore, not being a member of the crew, and being employed by the hour, can not recover for personal injuries suffered in unloading a cargo on the basis of a seaman's rights or contracts, but he must recover on principles of negligence. He was not a fellow servant of the captain and can recover for injuries caused by such captain's negligence.—HOWELL, 273 *Federal Reporter* 513.

* * *

"It is good law," said the court in the case of NEWBURGH, 273 *Federal Reporter* 436, "that when the burdened vessel decides to 'keep out of the way' by crossing the bows of the privileged vessel, though she gets an assent to such proposal, she assumes the risks involved in choosing that method. The duty of the privileged vessel in such cases is to co-operate, and she need not keep her course. * * * But such an agreement, initiated by the privileged and assented to by the burdened vessel, might be regarded as creating other duties. It could be considered as a proposal that the duties of the vessels should be reversed, and that the burdened (now the privileged) vessel hold her course and speed, so that the privileged (now the burdened) vessel might be able to forecast her positions at future moments, precisely as the rule requires when no agreements has been made." Speaking further, the court said that although the proposal emanates from the privileged vessel, and should be taken as meaning that she will undertake actively to keep out of the way, it need not absolve the burdened vessel from her similar and original duty also to keep out of the way, nor will it impose on her a rigid duty to hold her course and speed.

"It is true," it was observed, "that that duty is imposed by the rules generally as a correlative to the duty to keep out of the way, but only in cases where no agreement has been reached. Some convention is essential when neither knows the other's purposes, but when both have agreed upon a maneuver by an exchange of signals, their accord should be left for execution by movements adapted to the circumstances. For example, if the angle of crossing is wide, it will usually be best for the originally burdened vessel to hold her course and speed; but, if it be narrow, it is safest for both to starboard and pass at a greater distance."

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New Rules for Ships at Anchor

A new federal regulation, governing steamers and other steam craft at anchor, has been promulgated by the United States steamboat inspection service. According to this new rule, vessels propelled by machinery which are moored or anchored shall display by day, forward where it can be best seen, one black ball or shape not less than two feet in diameter. This rule was added to the regulations of the steamboat inspection service in compliance with the recommendation of the Maritime association of the Boston chamber of commerce several months ago, which urged the adoption of a day mark on steam vessels lying at anchor in order further to safeguard the movements of other vessels. The association showed that it is frequently difficult to see whether vessels are at anchor or moving slowly until other vessels approach too closely to keep clear.

Now the pilot rules for certain inland waters on the Atlantic, Pacific and Gulf coasts have been amended by the addition of this new rule covering the display of signals in the day time by steamers which are moored or at anchor.

William Shreve Doran, a marine engineer and president of the Alberger Pump & Condenser Co., New York, died in that city, recently.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to June 9, 1923, on Future Loadings

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 100 lbs.	††Finished steel
Liverpool	1s 9d	$0.35	$0.20	$0.17	$0.30	$0.60	$7.00T
London	1s 6d	0.35	0.20	0.16 to 0.17	0.30	0.60	7.00T
Christiania	$0.19	0.40	0.40	0.24	0.42½	0.85	8.00T
Copenhagen	0.19	0.40	0.40	0.24	0.42½	0.85	8.00T
Hamburg	0.11	0.27½	0.25	0.17	0.37½	0.75	7.00T
Bremen	0.11	0.27½	0.25	0.17	0.37½	0.75	7.50T
Rotterdam	0.11	0.25	0.25	0.16	0.35	0.70	7.00T
Antwerp	0.12	0.27½	0.25	0.18	0.35	0.70	7.00T
Havre	0.14 to 0.16	0.40	0.22½	0.23	0.40	0.75	8.00T
Bordeaux	0.14 to 0.16	0.40	0.22½	0.23	0.40	0.75	8.00T
Barcelona	0.22	0.54	0.50	7.00T	—16.00T—		10.00T
Lisbon	0.20	0.65	0.40	7.00T	—20.00T—		7.00T
Marseilles	0.17	0.55	0.50	5.60T	—20.00T—		5.00T
Genoa	0.18	0.50	0.35	0.30	0.40	0.80	6.00T
Naples	0.18	0.50	0.35	0.30	0.40	0.80	6.00T
Constantinople	0.22 to 0.23	15.00T	0.75	0.30	—20.00T—		8.00T
Alexandria	0.17 to 0.18	15.00T	0.75	0.30	—20.00T—		8.00T
Algiers	0.20	0.75	0.75	0.30	—20.00T—		10.00T
Dakar	.....	14.50T	.....	15.00T	—20.00T—		10.00T
Capetown	9.00T	15.00T	17.00T	9.00T	—15.00T—		10.00T
Buenos Aires	.....	20.00T	.....	.....	—20.00T—†		6.00T†
Rio de Janeiro	.....	21.00T	.....	7.00T	—21.00T—†		6.00T†
Pernambuco	.....	22.00T	.....	.....	—22.00T—†		8.00T†
Havana	0.22½*	0.37½*	.....	0.17½*	0.47*	0.94*	0.20*
Vera Cruz	0.20	0.30	0.35	0.25	0.52½	1.05	0.30
Valparaiso	.....	1.07	.....	0.70	0.45	0.80	12.00T
San Francisco	.....	0.35 to 0.40	.....	0.70	.....	.....	0.30
Sydney	.....	18.00T	.....	18.00T	18.00-24.00		9.00-12.00T
Calcutta	.....	16.00T	.....	15.00T	—16.00T—		10.00T

T—Ton. †Landed. ††Heavy products limited in length. *Extra charge for wharfage.

Principal Rates To and From United Kingdom

	s	d
Grain, River Plate to United Kingdom	25	0
Coal, South Wales to Near East	11	0
Coal, United Kingdom to Germany	5	3
Pig Iron, United Kingdom to U. S. Atlantic	15	0
Pig Iron, United Kingdom to U. S. Pacific	27	0
Coal, South Wales to Buenos Aires	13	6
Iron ore, Bilbao to Middlesbrough	8	0
General British market, six months time charters, per ton per month	6	0

From North Pacific Ports to	Lumber Per m. ft.
San Francisco	$6.50 to 7.50
South California	7.50 to 8.50
Hawaiian Islands	10.00 to 10.50
New Zealand	15.00 to 16.00
Sydney	15.00 to 16.00
Melbourne-Adelaide	15.00 to 17.00
Oriental Ports	11.50 to 15.00
Oriental Ports (logs)	18.00 to 19.00
Peru-Chile	13.00 to 15.00
South Africa	19.00 to 20.00
Cuba	13.00 to 16.00
United Kingdom	80s to 90s
United Kingdom (ties)	70s to 80s
Baltimore-Boston range	$12.00 to 14.00
Baltimore-Boston range (ties)	11.50 to 13.00
Buenos Aires	14.00
Flour and Wheat	
Oriental Ports (net ton)	$ 6.00
U. K. and Continent (gross ton)	33s to 38s
General Merchandise	
Oriental ports	$9.00
Steel	
Oriental Ports	$5.00T to 7.00T
Cotton	
Oriental Ports	35c to 50c per cwt
Apples	
United Kingdom	90 cents per box
Copper	
Oriental Ports	$5.00
Box Shooks	
Oriental Ports	$10 measurement ton
Metal Junk	
Oriental Ports	$10.00
Scrap Copper	
Oriental Ports	$5.00
Salt Herring	
Oriental Ports	$8 measurement ton
Machinery	
Oriental ports	$7.00
Automobiles	
Oriental ports	$8.00

Bunker Prices

At New York

		Coal alongside per ton	Fuel oil alongside per barrel	Diesel oil alongside per gallon
April	6, 1922	$5.30 @ 5.90	$1.16½	4.75 cents
July	1	8.10	1.26½	4.75 cents
Oct.	13	8.55	1.45	5.50 cents
Jan.	11, 1923	7.90	1.50	4.75 cents
April	11	6.75@7.50	1.76½	5.10@5.35c
May	11	6.25@7.50	1.76½	4.65@5.65c
June	9	5.50@7.25	1.76½	4.90 cents

At Philadelphia

		Coal alongside per ton	Fuel oil alongside per barrel	Diesel oil alongside per gallon
April	10, 1922	$5.90 @ 6.25	$1.05	4.25 cents
July	1	8.00	1.15	4.25 cents
Oct.	13	8.30	1.47	5.00 cents
Jan.	9, 1923	7.30 @ 8.00	1.57½	5.00 cents
April	10	6.00 @ 6.50	1.87	5.10 cents
May	11	5.75 @ 6.25	1.85	4.90 cents
June	9	5.50 @ 6.50	1.72	4.50 cents

Other Ports

Boston coal, per ton	$10.00
Boston, oil, f. a. s., per barrel	$1.57
Hampton Roads, coal, per ton t.i.b.	7.00
Seattle, coal, per ton	7.50 to 8.50
Cardiff, coal, per ton	30s
London, coal per ton	36s
Antwerp, coal, per ton	37s

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Shipyards Repairing Locomotives

Loss of Shipbuilding and Repair Contracts by Yards Specializing in Government Work Compels Plant Officials To Enter New Field

BY HERBERT R. SIMONDS

DISARMAMENT pledges dealt a severe blow to a number of large ship building plants which had specialized in navy work. The Fore River plant of the Bethlehem Shipbuilding Corp. probably suffered more severely than any other. Here cancellation of government contracts and the loss of government new business were chiefly responsible for a decline in number of plant workers from about 16,000 to 4,000. Obviously, with a large modern plant and an excellent working personnel company officials felt it highly desirable to keep the unit intact. To do this and to provide for the large overhead, more work had to be secured. Dickerings over the ship subsidy bill, the large number of idle shipping board vessels, and general conditions in the merchant marine field discouraged any attempt to fill up the gap left by the loss of navy work with general merchant vessel construction and repair. What then was to be done?

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All Shipyards Face Problem

To a greater or less degree nearly all large shipyards have been faced with this same problem. Two lines of work are immediately suggested by the present needs of the country. These are repair and construction of locomotives and other railroad equipment and the fabrication of steel for building construction. This latter field offers an excellent means of taking care of ship riveters and possibly some boilermakers, but these groups form a comparatively small proportion of the normal ship plant personnel, so that specializing on the fabrication of steel would mean a large increase in the number of riveters and a decrease in many of the other crafts. In the way of equipment changes also would have to be made as most of the general machine shop equipment could not be adapted to this line of work.

The repair of locomotives, on the other hand, utilizes nearly all of the regular shipyard trades and requires comparatively little change in shop equipment. Moreover, there is something similar in the general product. Both ships and locomotives are used in transportation and this furnishes a link of no mean importance between the industry of shipbuilding and that of locomotive construction. The country is in urgent need of locomotive re-

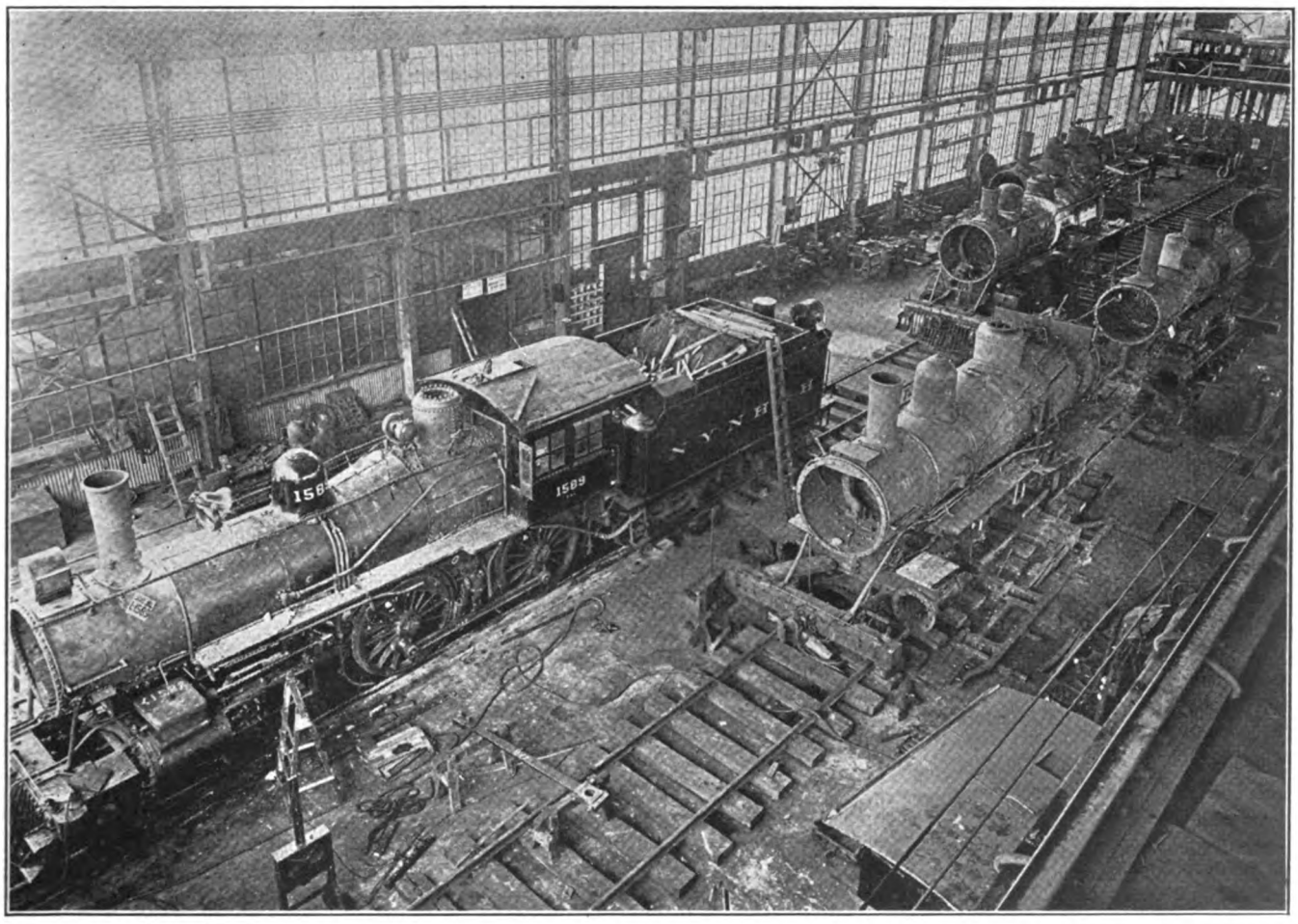

FIG. 1—TRACKS LAID ON THE CONCRETE FLOOR TRANSFORM A SHIPYARD MACHINE SHOP INTO A LOCOMOTIVE REPAIR SHOP. THIS METHOD OF LAYING THE TRACK PROVED BOTH SATISFACTORY AND ECONOMICAL

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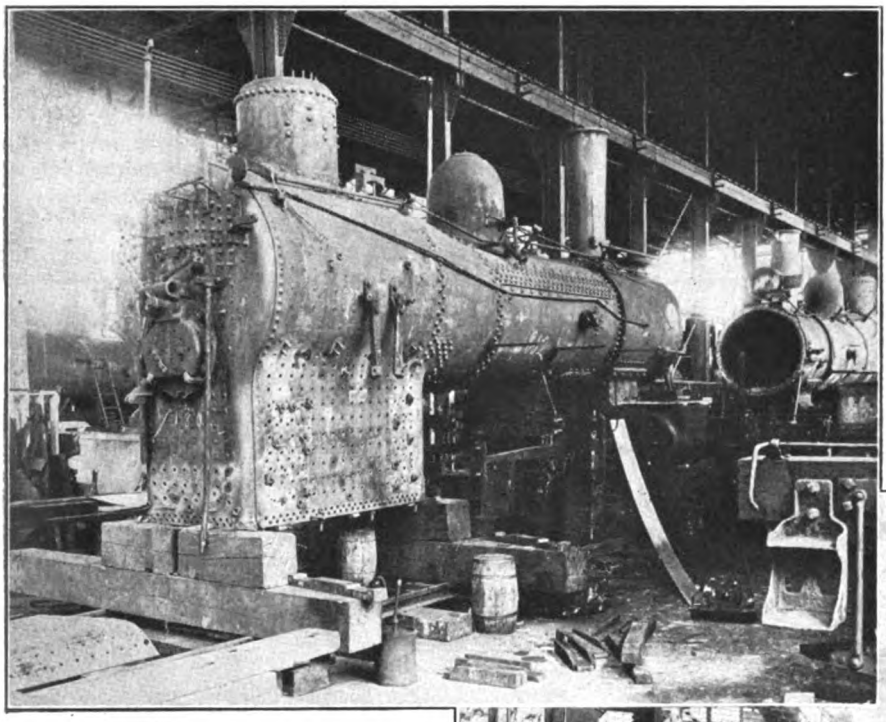
pairs and of new transportation equipment generally. In fact, as one shipbuilder has pointed out, the demand for railroad equipment more than offsets the reduction in demand for ocean vessel tonnage. Considering these points the repair of locomotives seems to be one of the big fields which must be turned to at the present time to save the country's large shipbuilding plants. The Fore River yard of the Bethlehem Shipbuilding Corp. was one of the first plants to start this line of work, and at present it is probably engaged in more extensive locomotive repair work than any of the other yards so that some features of the experience at this plant are of special interest.



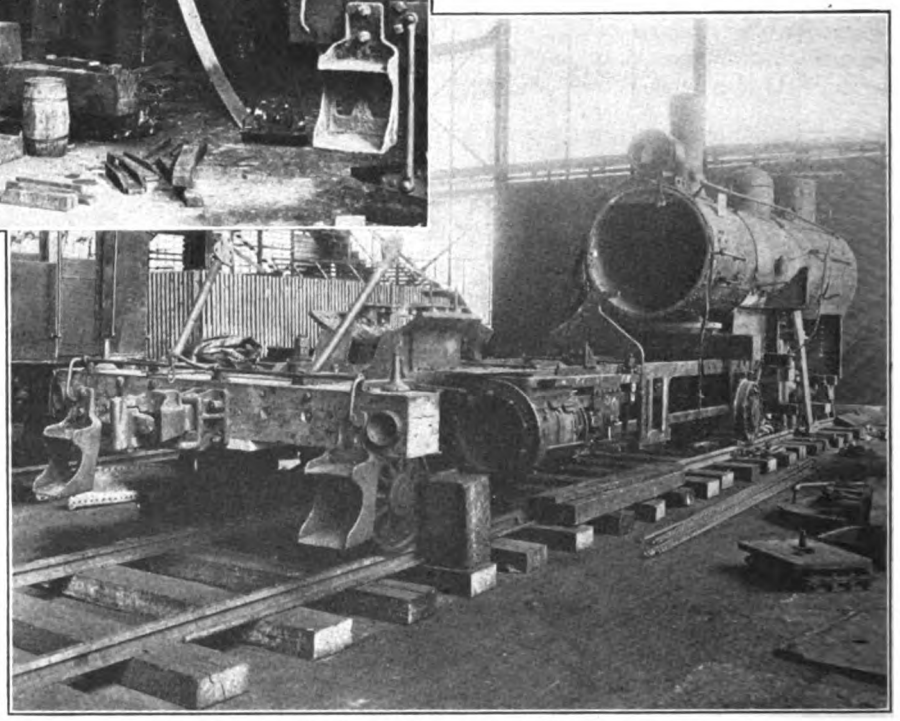


FIG. 2—(UPPER LEFT)—SHIP RIVETERS AND BOILERMAKERS FEEL AT HOME WHEN WORKING ON LOCOMOTIVE BOILERS AND FIREBOXES. FIG. 3—OFTEN, AS SHOWN IN THIS VIEW, IT IS NECESSARY TO START AT THE BOTTOM AND COMPLETELY REBUILD A LOCOMOTIVE WHICH HAS COME IN FOR REPAIRS

It is surprising to find upon investigation how many of the jobs in connection with overhauling and repairing locomotives fall directly in line with the customary work of a shipbuilding plant. Checking over the list of shipyard crafts and marking off those which are used for the repair of locomotives leaves few unmarked. Machinists are used in repairing the valve gears, truing up bearings, and in general work at nearly all points of the reconstruction. The ship boilermakers are transferred with little difficulty to the repair of locomotive boilers. Ship painters quickly learn to paint locomotives and tenders. The electrical department of a shipbuilding plant comes in handy in repairing locomotive generators and in taking care of the wiring which in modern construction is extensive. The pipe and copper shops of a shipyard are used for general locomotive piping. Tinsmith shops take care of the lagging. Joiners build cab decks and other light wood construction. Ship carpenters build bumpers and tender decking, and ship fitters woodwork on tenders. Ship riveters repair steel plate work on tenders. The blacksmith shop and the foundry furnish important service in the repair of tie rods, smoke stacks, boiler supports, and many heavy pieces in connection with both the locomotive and the tender.

Adapting Shop Facilities

A large machine shop of a shipbuilding plant requires almost no change to enable it to take care of a moderate amount of locomotive repair work. However, for a large volume of this work, the exclusive use of one complete shop is advisable. At the Fore River plant a large new building devoted during the war to turbine work was idle at the time the locomotive repair work was taken on. This building, therefore, was turned into a locomotive repair shop. The building which is about 100 by 200 feet is divided into two bays each 50 by 200 feet. Each bay has two 15-ton traveling cranes which serve the entire area. One end of one of the bays is shown in Fig. 1. The entire work of adopting this building to its new purpose consisted in laying four standards gage tracks, two to each bay, and connecting these with the yard spur. As the ties for the track were laid directly on the concrete floor, the construction was inexpensive. Rails were picked up at different points in the yard, thus the entire work of arranging the plant so that 13 locomotives could be repaired at one time cost less than $1500.

In addition to the building just mentioned a small space in the general machine shop which is close by has been taken over for locomotive work in order to secure two features, namely, the use of the 75-ton crane which operates in that shop, and the use of a pit below one of the tracks. In this second shop a space of about 50 by 50 feet is devoted to locomotive work, and these combined facilities make it possible for the company to turn out from three to four locomo-

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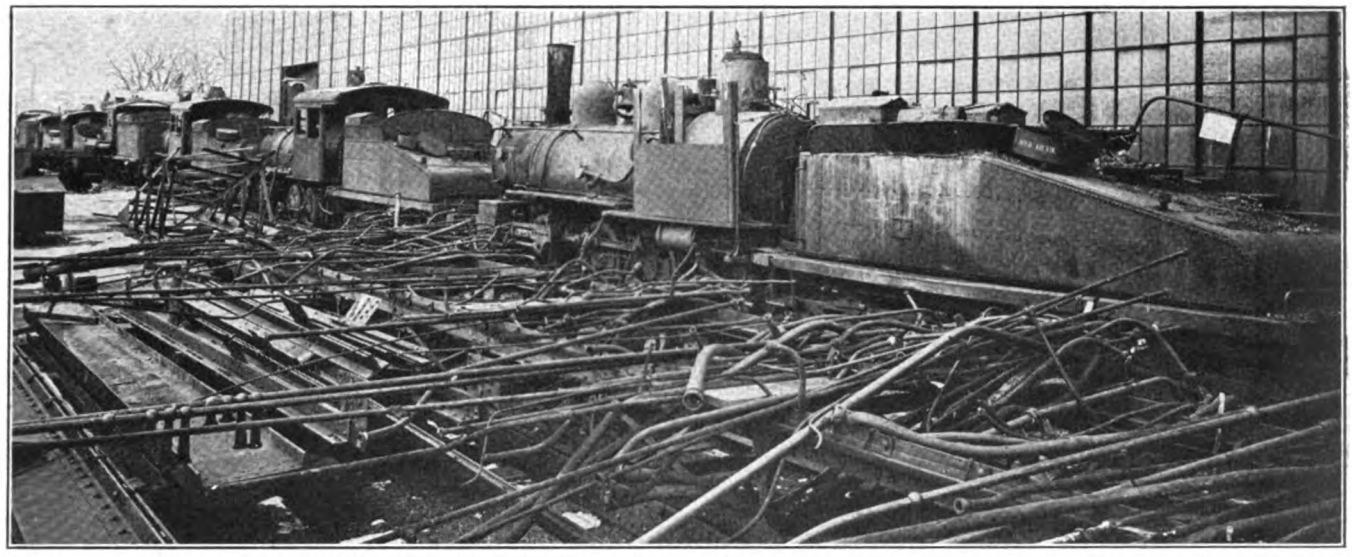

FIG. 4—LOCOMOTIVES RECEIVED FOR REPAIR ARE FIRST STRIPPED OF ALL PIPING WHILE WAITING IN THE YARD SIDING

tives a week. Nine locomotives were completely overhauled in March with green crews and with the unavoidable delays coincident with any new work on such a large scale.

A siding or spur track, of course, is necessary if any repair work at all is to be done. The Fore River plant is particularly fortunate in having ample siding space and close connection to the main line of the New York, New Haven & Hartford railroad. The plant is also fortunately located near the large Readville repair shops of this railroad. Without ample track facilities the handling and storage of locomotives which are to be repaired often presents a difficult problem. Railroads do not want to be held to any fixed time limit in the delivery of locomotives for repair, and it is safe to say that for successful handling of general railroad repair work, storage space outside of the shop should be at least equal to the amount of work turned out in a month.

Locomotive repairs are given different classifications according to the amount of work which is to be done. Most of the work undertaken at the Fore River plant follows under classification 3 and 4 and embodies complete overhauling. When a locomotive is received it is first stripped of all piping. This often is done in the

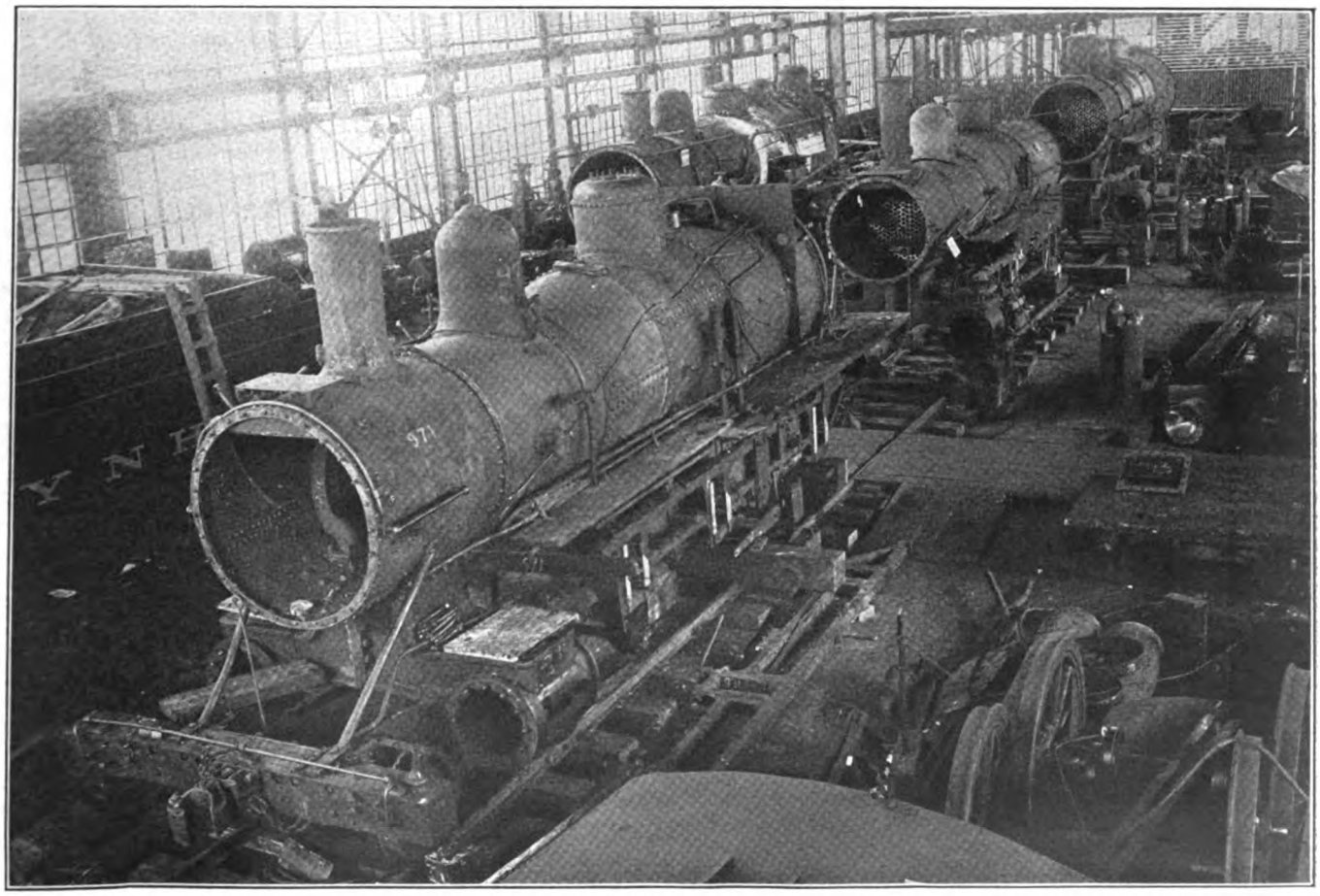

FIG. 5—ONE OF THE FIRST JOBS IS THE REMOVING OF THE BOILER TUBES. THIS IS ACCOMPLISHED BY MEANS OF THE ONYACETYLENE TORCH

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yard, and Fig. 4 shows a line of locomotives in the process of being thus stripped. Next the locomotives are taken to the main machine shop where the cab is removed and transferred to a cab repair section which occupies a balcony at one end of the building devoted to locomotive repair. This building is called the M. B. building. Cabs on this balcony may be seen at the extreme upper right in Fig. 1. Next in the repair sequence the complete body of the locomotive is taken off of the wheels and placed on temporary trucks which are used for transportation as the work progresses.

Figs. 2 and 5 show something of the nature of work on complete over-

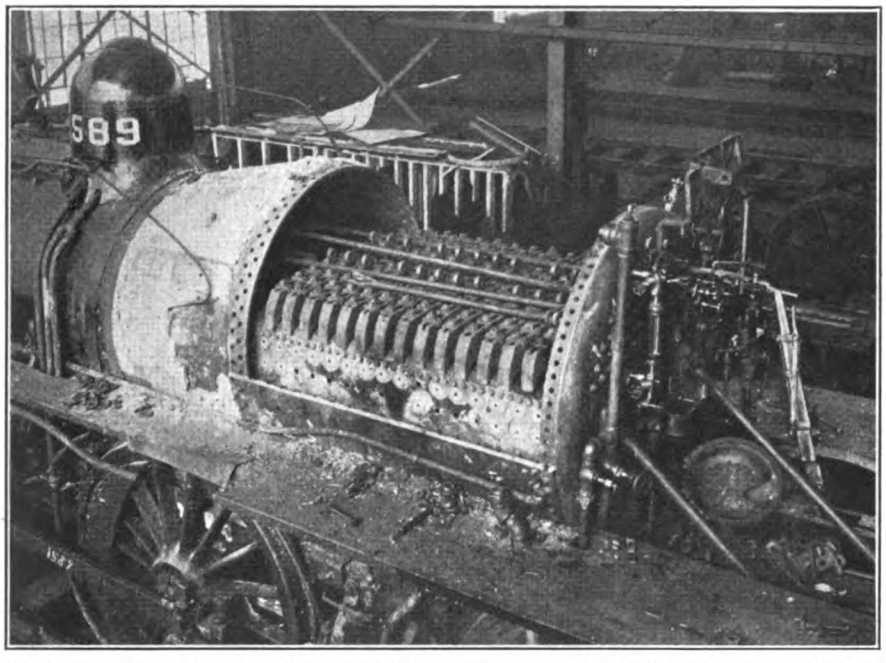

FIG. 6—A VIEW OF A PARTIALLY STRIPPED LOCOMOTIVE. AS EACH PART IS REMOVED, IT IS PAINTED WITH JOB NUMBER SO THAT IT WILL NOT GET LOST

hauling of locomotives. The cost of material and labor is charged against the order number of each unit. The regular railroad locomotive numbers are taken as the shop order number and as soon as stripping starts tags bearing this number are attached to each part. One of these tags is shown in Fig. 1. Early in the process of overhauling all tubes are taken out of the locomotive boiler and the boiler is scaled and cleaned throughout. Usually a new firebox is necessary and in any case some repair must be made to the firebox side sheets or the wrapper plate outside of the firebox. When boiler tubes are removed they are cut off with the oxyhydrogen torch and this, of course, means that they are too short to be used again in the same place. These tubes are repaired by first cutting clear of any defects at each end and then butt-welding on a new piece approximately a foot long. This is special work and unless there is a large quantity of it to be done over a period of considerable time it would hardly be advisable to do it at the shipbuilding plant. The tubes, however, are comparatively light and may be sent to some shop making a specialty of this work. At present at the Fore River plant new tubes are being used to replace the old ones and the old tubes are sent to the Readville plant of the New York, New Haven & Hartford railroad.

Electric welding occupies an important place in locomotive repairing, but this is a decidedly familiar operation in the construction of large steel vessels, and, therefore, no special adaptation is necessary. As shown in Fig. 6, for instance, it might be necessary to remove half of the side plate shown in the foreground. This would be cut off square and a new piece cut to fit would be placed in position and the joint butt welded. Such a repair is permissible only where the surface is held by stays. On the boiler proper a defective place would be repaired by a riveted lap patch. Work, of course, must conform to interstate commerce commission requirements and this governs many of the points in connection with repairs.

Handling Special Work

Auxiliary pieces such as air compressor, injector, generator, etc., usually are taken off and sent to specialized departments for repair. Practically every generator which comes into the shop must be overhauled and this is done without difficulty by the ship's electrical department. The air compressor is a somewhat more specialized piece of apparatus and wherever repairs are extensive the whole compressor is sent to the compressor department of the railroad shops. New tanks, however, are made up in the tinsmith shops; castings in the foundry; and braces, hand rails and handles in the blacksmith shop. Painting is necessary on all work. This is done mostly by compressed air spray. Fig. 6 is a detailed view taken about midway of the disassembling process. This shows the boiler construction and the regulating and insulating material surrounding it. Many parts such as grates, firebox doors and bells are either bought from the railroad or else supplied in accordance with the terms of the contract. This necessity of buying new parts which are stocked by a railroad and which, of course, are not carried by a shipbuilding plant causes some complication in the adjustment of contract price.

Bidding for Work

At the time the Bethlehem Shipbuilding Corp., Ltd., decided to go into locomotive repair work, the New York, New Haven & Hartford railroad was in urgent need of outside assistance, owing to the fact that its railroad repair shops had been out on a strike for a period of some months. The work to be done was thrown into the open market and different shops submitted their propositions for doing this work. The Fore River yard, being in a peculiarly advantageous position, secured a contract for the repair of 50 locomotives. Of this number over 25 have been delivered to date. The progress on the repairs to these locomotives has been unusually good and the workmanship has been entirely satisfactory to the railroad. At the present time there are approximately 500 men employed on this work at the Fore River plant.

The shipping board has sold to C. W. Cook, San Francisco, the steel steamers CADARETTA, DOYLESTON and GLYMONT. They will be used in the coasting trade. These vessels are of intermediate size. They were built in Portland during the war period.

LLOYD B. SANDERSON SR., managing director of the Royal Mail Steam Packet Co. in the United States, sailed for England recently on a combined business and pleasure trip.

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